WORK AND SAFETY PLAN

GYPSY MOTH SUPPRESSION PROJECT

MONONGAHELA NATIONAL FOREST

1993

USDA Forest Service
Monongahela National Forest and
NA Forest Health Protection
Elkins, WV 26241
304-636-3803

WORK AND SAFETY PLAN

INTRODUCTION

The advancing front of gypsy moth defoliation is progressing south and west onto the Monongahela National Forest. Localized populations meeting treatment intervention protocols, as identified by fall 1992 egg mass surveys, will be treated aerially in the spring of 1993, with Bacillus thuringiensis var. kurstaki (Btk) or GYPCHEK (GYP). The treatments used on this project were designed to meet the project objectives and minimize potential adverse environmental impacts. An environmental assessment was prepared by the Monongahela National Forest Supervisor's Office, Elkins, West Virginia, comparing various management alternatives. Copies are available at this office.

This Work and Safety Plan includes information on project location, administrative organization and responsibilities, pre-spray and spray activities, monitoring activities, public notification and information, safety guidelines, and accident reporting.

OBJECTIVES

The MNF Land Management Plan (LMP) standard and guides (p. 58) state that we will consider pesticide use only where it is essential to meet management goals. The MNF seeks to minimize the environmental consequences of GM aerial application with mitigations measures which limit the treatment area, selecting the insecticide most specific for GM and with the least effect on non-target lepidopterans, other invertebrates, and non-game vertebrate and wildlife species populations present in treatment units. To achieve this goal, the MNF seeks to select integrated management strategies in as many treatment units as possible operationally and economically given the availability of these materials and methods of delivery of viable products. Additionally, the MNF seeks to contract for aerial application services from the most reliable, experienced and least expensive private contractors knowledgeable in the mixing, loading and application of insecticides.

To meet MNF LMP goals, the following efficacy standards for the GM project must be met within each treatment unit: 1) protect the forest canopy by preventing defoliation from reaching 30 percent which is the intensity aerially visible with remote sensing techniques, such as photography and/or airborne videography; 2) reduce gypsy moth populations in the next generation after treatment to 250 egg masses/acre or less in treatment units with developed recreation areas; 3) reduce gypsy moth populations in the next generation after treatment to 500 egg masses/acre or less in treatment units with timber, wildlife and watershed and dispersed recreational values and uses. The Northeastern Area Forest Health Protection (NAFHP) forest pest specialist assigned to the MNF will determine whether these objectives have been met within each treatment unit using the Treatment Monitoring Data Base (TMDB) Standards and Procedures developed by NAFHP.

Furthermore, the MNF seeks to encourage biodiversity by developing pertinent information to assist future management decisions on the environmental consequences of treatments on selected non-target Lepidoptera (moths and butterflies) listed as "Species of Special Concern" to the West Virginia Division of Natural Resources, Natural Heritage Program (WVNHP). The NAFHP forest pest specialist assigned to the

MNF will develop and coordinate through natural resource biologists at WVNHP and lepidopterists at the Carnegie Museum of Natural History (CMNH), Invertebrate Zoology, the survey of non-target Lepidoptera within unique forest habitats on the North Fork Mountain and Cave Mountain areas of the Seneca Rocks National Recreation Area where numerous treatment units are located (see Appendix F).

The safety goals of this project are to complete the tasks outlined in a safe and efficient manner. The following objectives provide guidelines to meet these goals.

1. Each person involved in the project must know and understand this action plan and adhere to safety practices outlined here and in other supporting documents.

2. Conduct operations at all times to provide for safety of the crews and equipment.

3. Evaluate any procedure or task for the hazards involved and ensure that completion of the job does not compromise the safety of personnel or equipment.

4. Provide personal protective equipment, monitor its use, and evaluate the success of the project based on the completion of the project without accidents or injury to personnel.

ORGANIZATION

The Monongahela National Forest Gypsy Moth Spray Project will utilize the Incident Command System (ICS). The organization for project personnel assigned to the project and their responsibilities are shown on the following pages.

~~PROPOSED~~ CHAIN OF COMMAND FOR 1993 GM SPRAY PROJECT

INCIDENT CMDR.
GARY BUSTAMENTE

- SAFETY - MIKE LEDDEN
- LAISON - GARY BUSTAMENTE
- PIO - KATE GOODRICH / TERRY FREY

PLANS
BOB ACCIAVATTI

OPERATIONS
TIM SHERA

LOGISTICS
ROD WHITEMAN

FINANCE
BOB ACCIAVATTI

ASSISTANT
BARB BENNETT

AIR
ROD WHITEMAN

GROUND
KAREN FELTON

AERIAL OBS.
~~WAYNE (?)~~
~~KRETSYNGER (?)~~
ALT. (TIM SHERM)
(BOB ACCIAVATTI)
Jim Dobson

TOLC
MIKE LEDDEN
(SCOTT WELLS)

TWO
2 person field crews
Nancy Meyers

TECHNICAL EXPERTS
GPS DOCUMENTATION
RADIO
CALIBRATION
ENTOMOLOGY

PROJECT RESPONSIBILITIES

The aircraft to be used on this project will be contracted by the Monongahela National Forest (MNF). Forest Health Protection (FHP) staff, Morgantown, WV, will provide support.

Project Incident Commander (Gary Bustamente, MNF)

Responsible for overseeing spray project, submitting suppression tracking and operations reports to FHP and SO, assigning aircraft to various blocks, briefing pilots before and after treatments, preparing project work and safety plans and final report of project.

Operations Chief (Rod Whiteman, FHP), Assistant Ground Operations (Tim Sherm, MNF)

Responsible for calibrating aircraft, for mixing and loading operations and spray record forms, submitting progress reports, assigning aircraft to various blocks, briefing pilots before and after treatments, overseeing aerial observers, maintaining contact with treatment blocks to monitor weather conditions and determine when to start and stop treatments.

Plans Chief (Bob Acciavatti, FHP)

Responsible for preparing TMDB forms, acquiring insect and host development data, releasing spray blocks for treatment, preparing project work and safety plans.

Logistics Chief (Rod Whiteman, FHP)

Responsible for procuring spray project supplies and I.C. Command Post, procurement and installation of radio, weather and other equipment and supplies.

Finance Chief (Bob Acciavatti, FHP), Assistant (Barb Bennett, MNF)

C.O.R. for project; approving and signing contractor's daily records as basis for payment; local purchasing of supplies, equipment and services.

Safety Officer (Mike Ledden, MNF)

Monitor actions of the contractor and field crews to assure that the project is carried off without injury to contractors, government employees, members of the public, or the environment. Responsible for reporting and investigating spills or misapplication of insecticides, and for reporting aircraft accidents to the proper authorities.

Public Relations Officer (Kate Goodrich, MNF)

Will be responsible for answering questions from the public and news media, communciations with state and local police, schools, radio stations, etc.

Liason Officer (Gary Bustamente, MNF)

Coordinates MNF spray activities with WV-Agr, FAA and military aircraft; provides information to Incident Commander about WV-Agr activities.

Radio Operators (Mike Ledden, Scott Well, MNF)

Responsible for radio communications and keeping radio log.

Aerial Observers (Jim Dobson, Bob Acciavatti, FHP; Tim Scherm, MNF)

Provides data to Incident Commander on actual spray operations by contractor to be used for documenting aerial application and to start or stop operations because of adverse weather.

Field Crew Coordinator (Karen Felton, FHP)

Responsible for organizing crews to mark and monitor blocks, for crew safety, and for communication with aerial observers and the airport.

Field Crews (FHP and MNF Personnel)

Responsible for being on spray blocks when the application is taking place. This is to insure that material is being applied only within designated boundaries. Field crews also raise helium balloons at block corners to guide the pilot to the correct areas; take weather data on or near spray blocks, post information signs available from the MNF-SO on sprayed areas and otherwise inform the public about the operation.

PROJECT AREA AND SPRAY BLOCKS

The sixteen (16) spray blocks cover approximately 10,068 acres (2,698 acres of GYPCHEK and 7,370 acres of Btk) are scattered across the northern half of the Potomac Ranger District. The blocks are in southern Grant and northern Pendleton counties. Descriptions and maps of the blocks showing identification numbers, acreages, and elevations and aspects are attached (see Appendix A).

The five (5) GYPCHEK blocks will be sprayed twice, about 3-5 days apart; the eleven Btk blocks will only be sprayed once. The release of spray blocks will depend on insect development and foliage expansion; however, all GYPCHEK blocks will probably proceed Btk spray blocks because of their elevation. This may vary, however, due to variations in weather and logistics.

PRESPRAY MONITORING

Based on ground crew field observations and timely reports, the Plans Chief will determine when a block is ready for treatment and release blocks by notifying the Incident Commander in writing. Selected areas in or near spray blocks will be checked every few days starting in late April to determine when egg hatch is complete, larvae have dispersed from the egg masses, and when they are in the first and second instar (developmental stage) so that Btk and GYPCHEK can be applied at the proper time. The objective is to release the spray blocks when 50 percent of larvae have reached the second instar; and when oak leaf expansion has reached at least 30 percent; both are crucial to obtain good population reduction. The extreme variation in elevations and aspects of slopes in the drainages within most of the spray blocks will influence development of the gypsy moth and tree foliage expansion. Therefore, this influence must be taken into consideration when releasing blocks along with the insect and host observations.

SPRAY OPERATION

With normal seasonal development, treatment is expected in the last 2-3 weeks in May and 1-2 days in June. Field crews will have responsibility for getting helium balloons above block corners before the spray aircraft is ready to treat the area. Crew members should also be prepared to answer questions from the public. Very early hours will be necessary, as spraying usually begins at dawn.

The normal procedure will be for each crew member to get his/her block and corner assignments the afternoon or evening prior to each spraying day. Each person or team will then be responsible for putting up a 36" balloon at each assigned corner before spraying is to begin. Crew members may be required to move quickly from one spray block to another to keep up with the spraying because of the limited crews available. Movement of the crews will be controlled by the project coordinator, field crew supervisor, or aerial observer. Some crew members may also be assigned to positions along access roads to spray blocks to stop and inform members of the public about the project. In some areas, signs will be posted along access to spray blocks informing the public of the material used and the date applied. One spray block includes developed campgrounds which will involve, with assistance from USFS District personnel, contacting and asking publics to vacate premises the day before actual spray application.

Aircraft will be calibrated by assigned personnel a day or two before the project begins to insure that the various insecticides are delivered to the site at the proper rates. Application rates to be used are as follows: Btk - 36 BIUs per acre; GYPCHEK - 5×10^{11} PIBs per acre per application. All mixing and loading of insecticides will be performed by the application contractor. A spray record showing the flight time, spray time and gallons sprayed will be kept by the Operations Chief (see Appendix D).

No application will be made when foliage is wet, rain is imminent, temperature exceeds 80°F, relative humidity is below 50 percent, or wind is in excess of 10mph. Fog conditions at either the airport or spray blocks often delay spray operations in the spring.

HELIUM AND BALLOONS

All balloon corners will be flagged before spraying begins. Normally, this can be done during development sampling. Each corner requiring marking will use a yellow or white latex balloon on a single cotton kite string. After the balloon is inflated and attached to the end of the string, it should be raised carefully through the canopy and tied off at the ground when the balloon is about 30-50 feet above the canopy. Most balloon points are along roads so that a vehicle with a large helium tank can be driven to them. A small number of portable helium tanks will be available for sites requiring a longer walk in. In the most remote balloon points requiring hking, Hi-Float may be used the afternoon before spraying to keep balloons up over night. All balloons and flagging will be cleaned up after the project ends.

Empty helium tanks will be refilled only by the logistics chief from large tanks because this can be very dangerous to project personnel and must be handled only by an experienced person. Some safety considerations: Do not drop or allow tanks to roll around inside a vehicle, and do not transport a helium tank with the regulator attached as it can break off and turn the helium tank into a projectile.

SPRAY MATERIALS

Btk and GYPCHEK are considered non-toxic to all mammals including humans (see Appendix C). Therefore, being present in a block during treatment should not place an employee at any significant risk. However, any methods available to avoid direct contact with spray materials should be employed, such as getting in a vehicle when a spray aircraft is directly overhead and advising residents of the spray area to remain in their homes during the operation. Labels and information sheets concerning spray materials are attached.

RADIO COMMUNICATIONS

Handheld King programmable radios will be used by ground crews for local communications. Air net radios will be used to communicate between aerial observers and spray pilots. The radios have been programmed to provide communication USFS personnel, and one weather station. Scanning rapidly uses up battery reserve so only scan when necessary. Radio training will be provided to project personnel. Use applicable procedures. Channel designations will be issued at the project briefing as an attachment to this document. Every attempt should be made to minimize radio conversation and time on crew net. Aerial observation planes will communicate directly to field crews.

PUBLIC NOTIFICATION

Attempts have been made to contact all landowners located immediately adjacent to Federally owned spray areas. Several public meetings and openhouse sessions were held and there have also been numerous newspaper and radio releases. No spray objectors were identified. Further notification of the general public will be conducted by newspaper and radio releases and block postings immediately before the operation is to begin. The local MNF Seneca Rocks radio will carry spray project information. A recorded message at the end of each spray day will be made by the P.R.O. on an answering machine located in both Elkins SO and the Potomac RD.

PROJECT EVALUATION

Success at meeting project objectives will be determined through defoliation assessment using airborne videography by FHP or high level aerial photography from R-8 or low leve sketch mapping from WVDA. The level of population reduction in the treatment areas will be determined from post-spray fall egg mass sampling as part of the FHP Treatment Monitoring Data Base (TMDB). TMDB Protocols and Forms provide detailed data about the spray system and operational conditions during spraying. Field crews have a major responsibility to ensure that complete and accurate observations are made and recorded (see Appendix B).

APPENDIX INDEX

A. Proposed gypsy moth treatment units descriptions and maps, Potomac RD, MNF, 1993

B. 1993 Gypsy Moth Suppression Project Monongahela NF - Instructions for Field Personnel

C. Forest Health Protection Health and Safety Plan

D. Project Accident Procedures for Ground Personnel and Aircraft

E. 1993 Monongahela NF Aircraft Spray Record Forms

F. Non-target Moth Survey for Rare Boreal Species

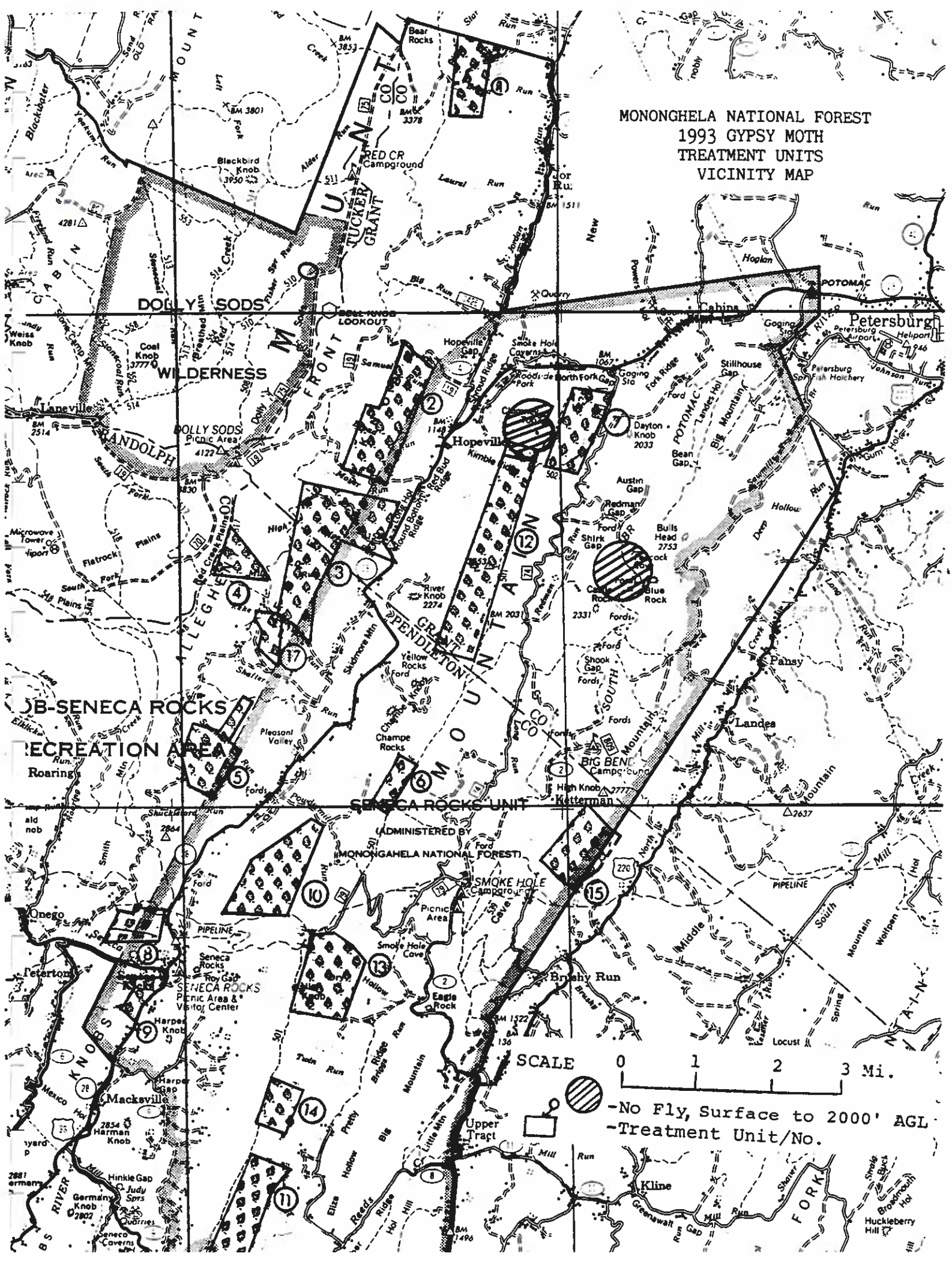
APPENDIX A

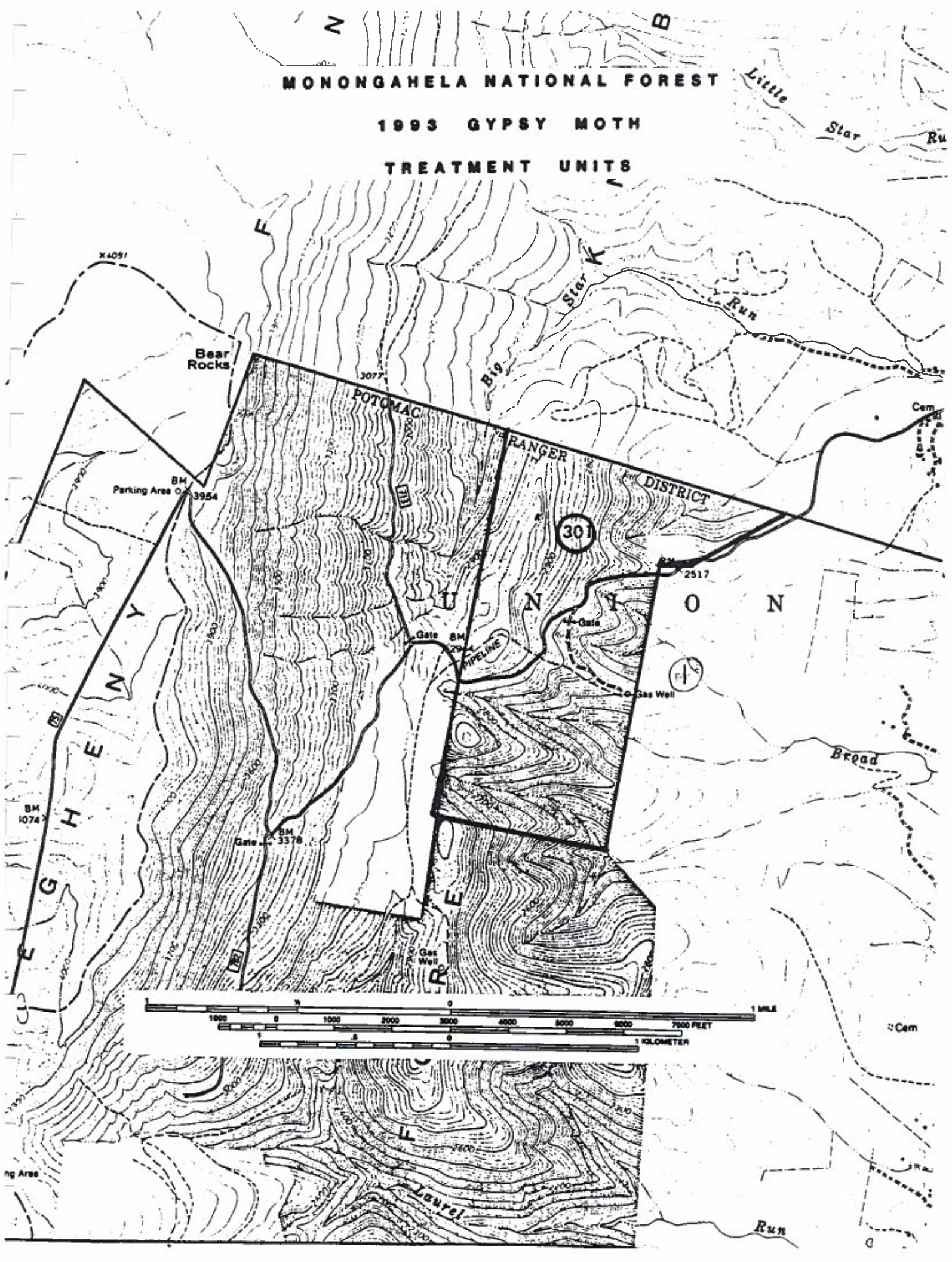
Proposed Gypsy Moth Treatment Units Descriptions
and Maps, Potomac Ranger District, MNF, 1993

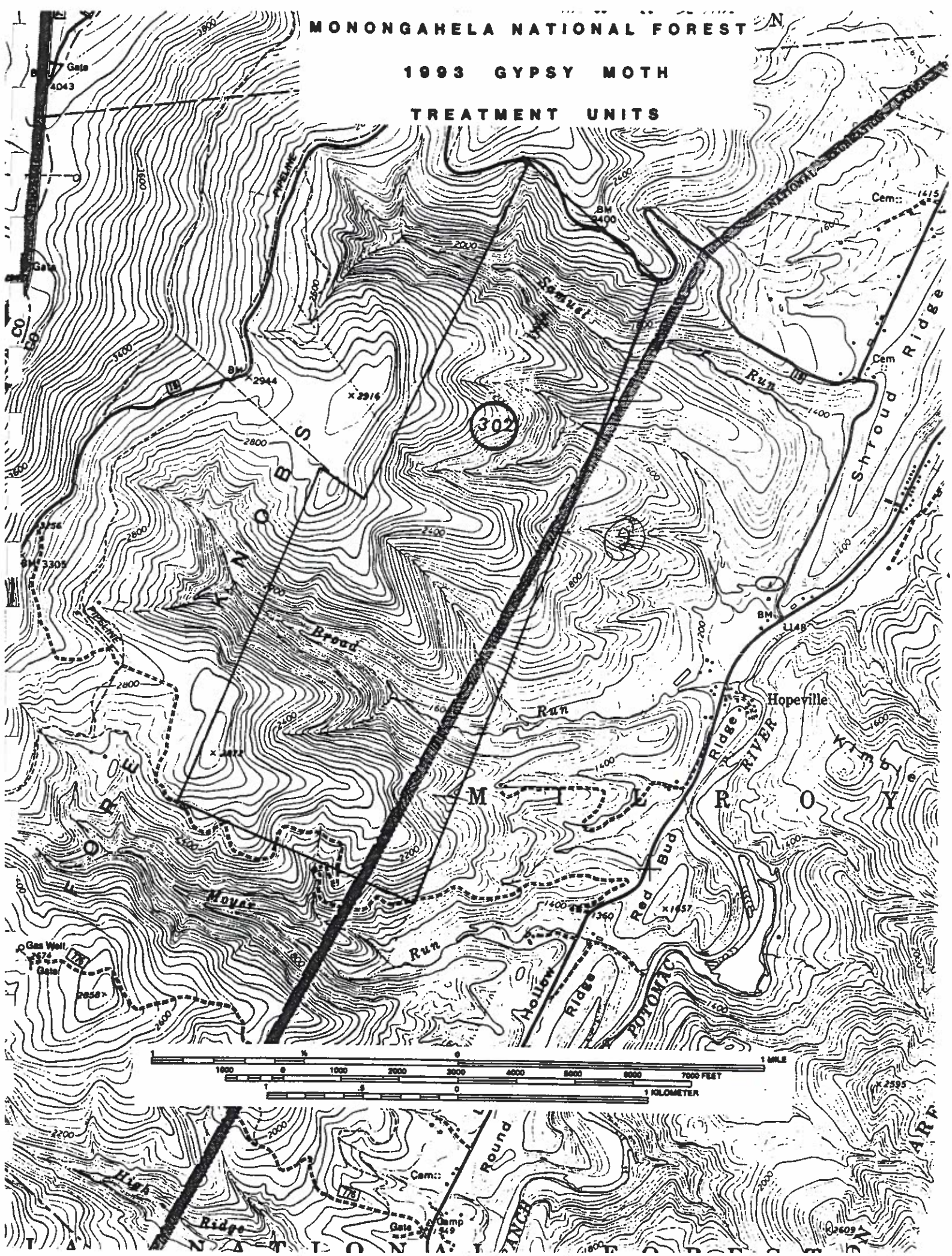
APPENDIX A

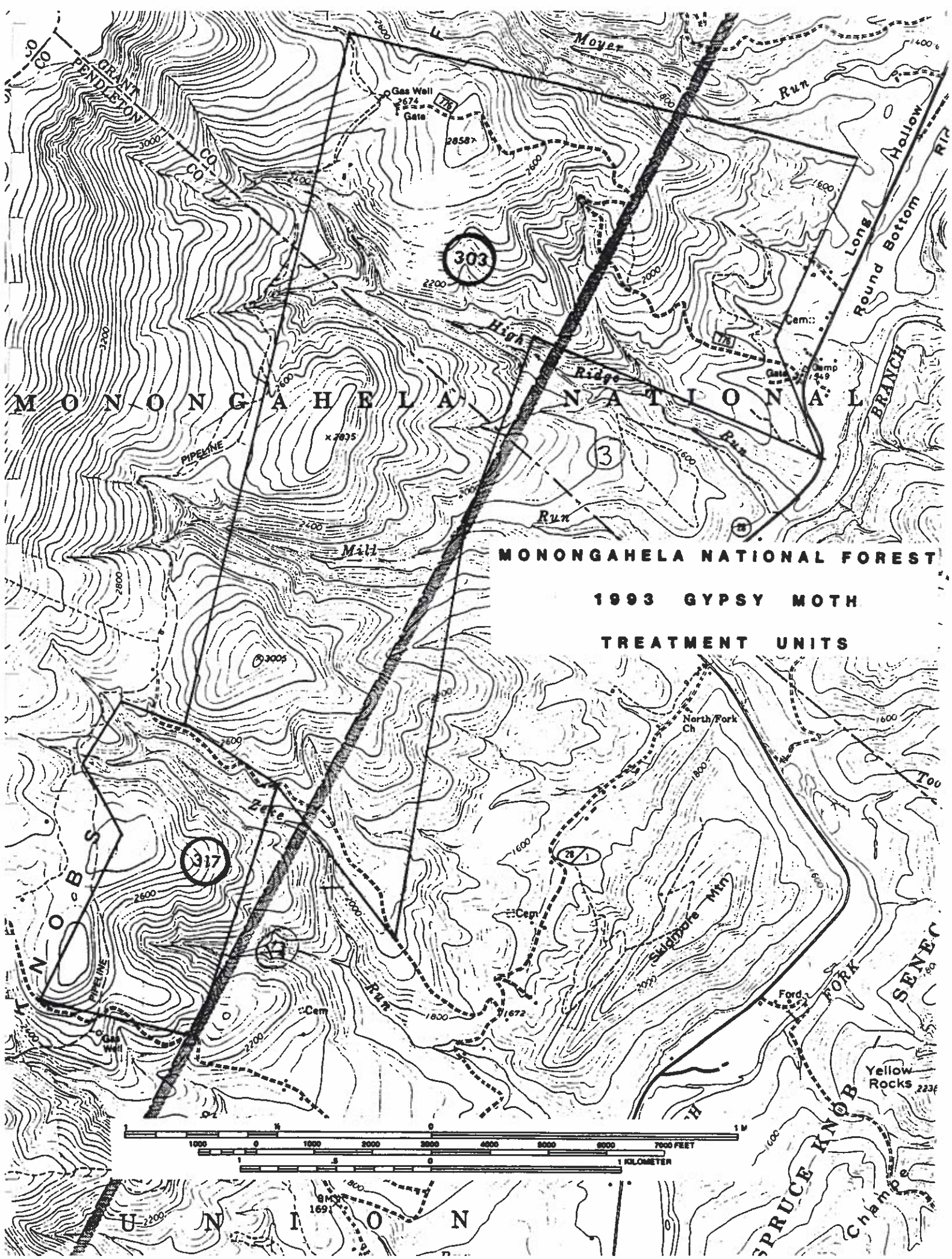
PROPOSED GYPSY MOTH TREATMENT UNITS, POTOMAC RD, MNF, 1993

			SPRAY MATERIAL		BLOCK ELEVATION (FT)		
QUAD NAME	TREAT-MENT UNIT	AREA (AC)	BTK	GYP	RANGE	DIFFERENCE	ASPECT
Blackbird Knob	301	459	X		2100-3140	1040	E
Hopeville	302	1057	X		1440-2880	1440	E
Hopeville	303	1773	X		1540-3005	1465	E
Hopeville	304	337	X		2600-4080	1480	E
Hopeville/ Upper Tract	305	641	X		1680-2856	1176	E
Hopeville/ Upper Tract	306	269		X	2400-3331	931	E-W
Petersburg West/ Hopeville	307	341		X	1120-2400	1280	E
Onego	308	304	X		1642-2240	598	E
Onego	309	187	X		1640-2684	1044	E
Upper Tract	310	981	X		2000-3700	1700	W
Upper Tract	311	985		X	2240-3400	1160	E
Hopeville	312	524	X		2000-3553	1553	W
Upper Tract	313	800	X		2000-3760	1760	E
Upper Tract	314	337		X	2280-3523	1243	E
Mozer/Upper Tract & Petersburg West	315	484		X	1760-2531	771	E
Hopeville	317	307	X		2000-2800	800	E
TOTAL		**10,068**					


MONONGHELA NATIONAL FOREST
1993 GYPSY MOTH
TREATMENT UNITS
VICINITY MAP
DOLLY SODS
WILDERNESS
SENECA ROCKS UNIT
(ADMINISTERED BY
MONONGAHELA NATIONAL FOREST)
SCALE
0 1 2 3 Mi.
-No Fly, Surface to 2000' AGL
-Treatment Unit/No.


MONONGAHELA NATIONAL FOREST
1993 GYPSY MOTH
TREATMENT UNITS
Little Star Ru
Star Run
Big
Bear Rocks
POTOMAC
RANGER DISTRICT
301
BM 3954
Parking Area
BM 2517
Gate
BM 29
PIPELINE
Gas Well
Broad
BM 1074
Gate
BM 3378
Gas Well
Laurel
Run
Cem
1 MILE
7000 FEET
1 KILOMETER

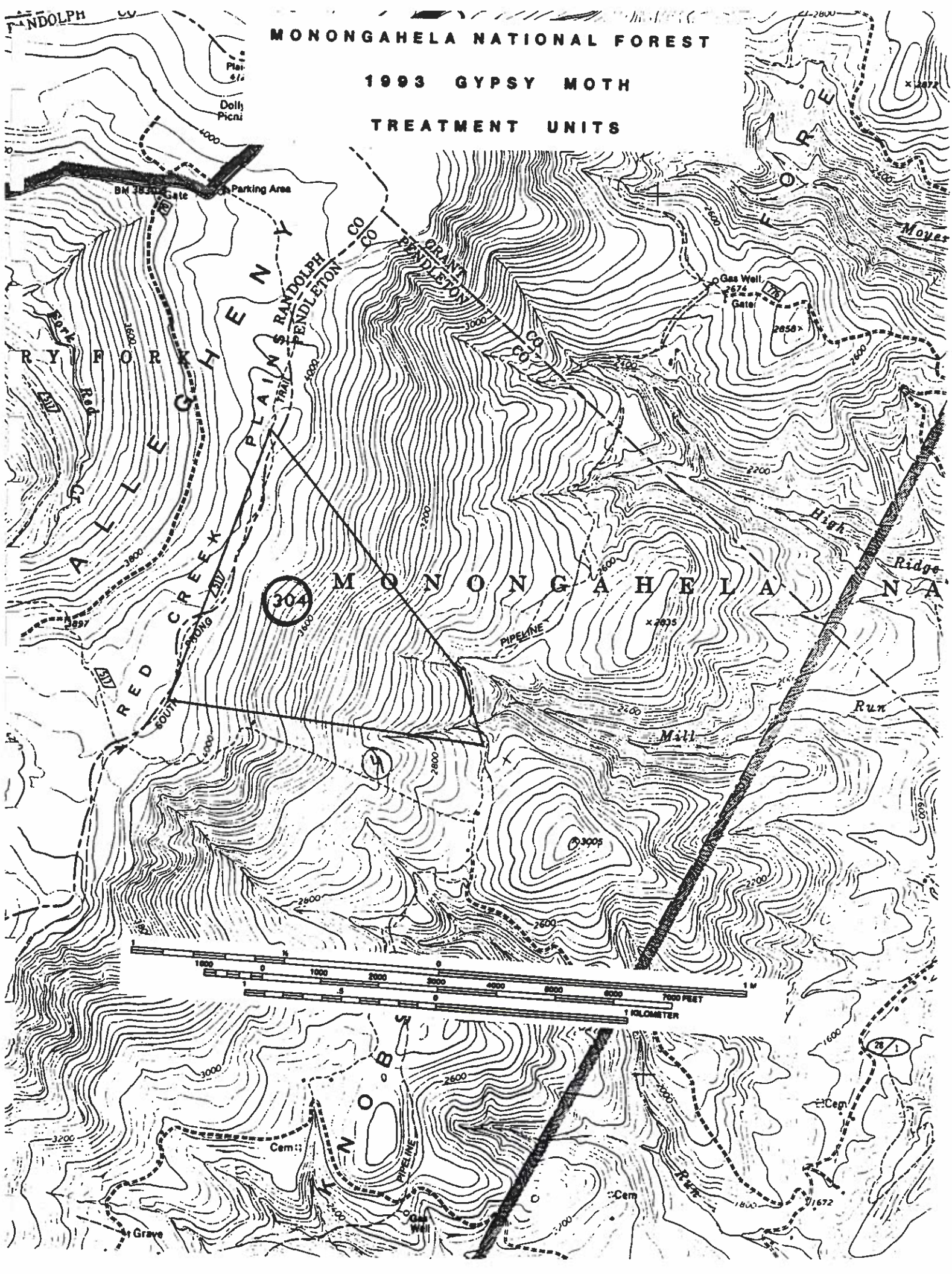

MONONGAHELA NATIONAL FOREST
1993 GYPSY MOTH
TREATMENT UNITS
302
Gate
4043
Gate
Gate
Gas Well
2674
Gate
Camp
949
Cem.
Cem.
BM
2944
BM
3305
BM
1400
BM
1148
Samuel
Run
Broad
Run
Moyer
Run
Red Bud
Ridge
Hollow
Ridge
Ridge
Ridge
Round
High
Shtoud Ridge
Hopeville
RIVER
POTOMAC
PIPELINE
PIPELINE
NATIONAL
MILE
1 MILE
7000 FEET
1 KILOMETER

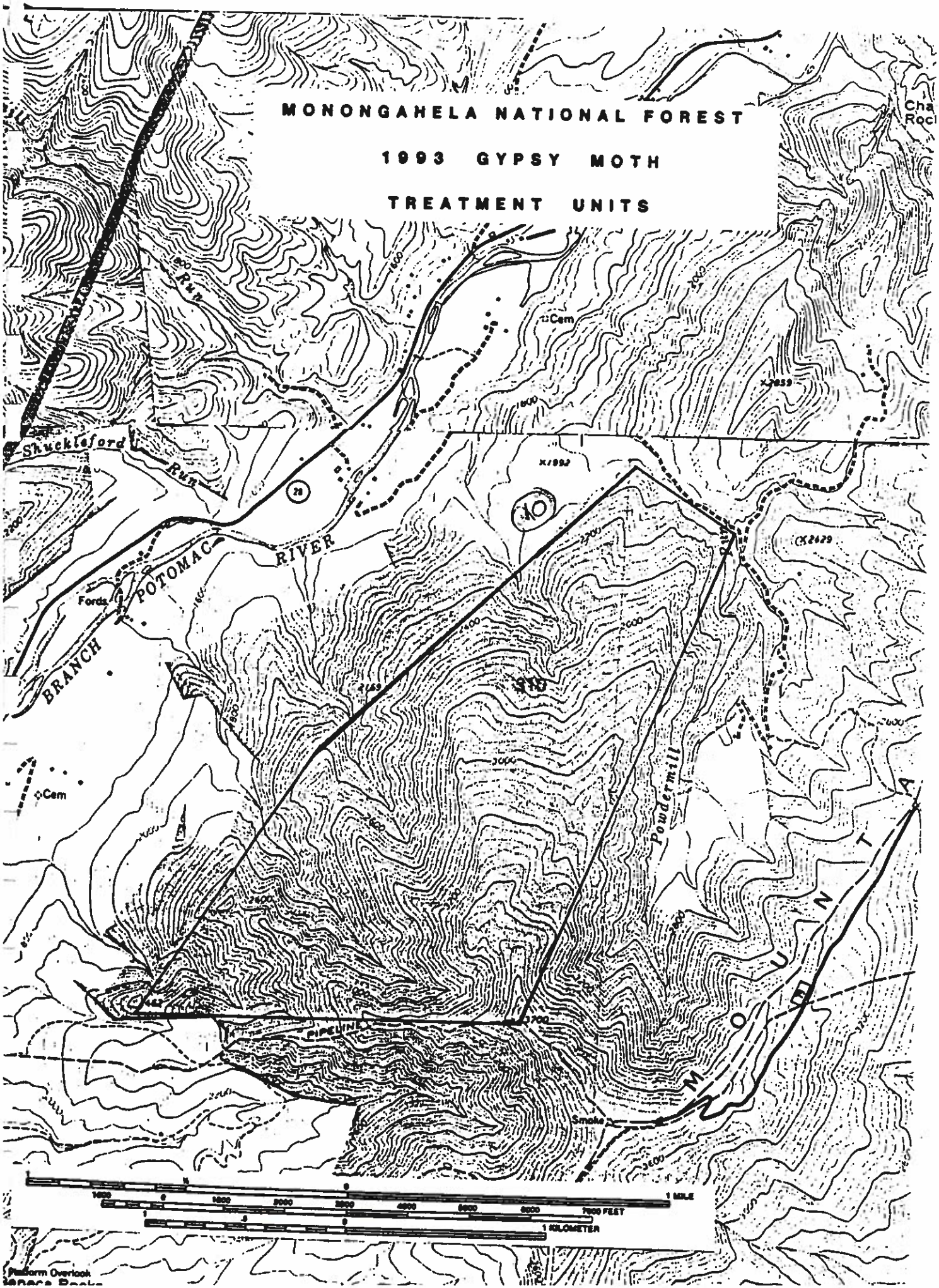

MONONGAHELA NATIONAL FOREST
1993 GYPSY MOTH
TREATMENT UNITS
303
317
3
MONONGAHELA NATIONAL
Moyer Run
Round Bottom Hollow
Long Run
High Ridge
Mill Run
Pipeline
Gas Well
Gate
Cem.
Camp
North Fork Ch
Skidmore Mtn
Ford
Yellow Rocks
Spruce Knob
Union
GRANT
PENDLETON
CO.
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 .5 0 1 KILOMETER

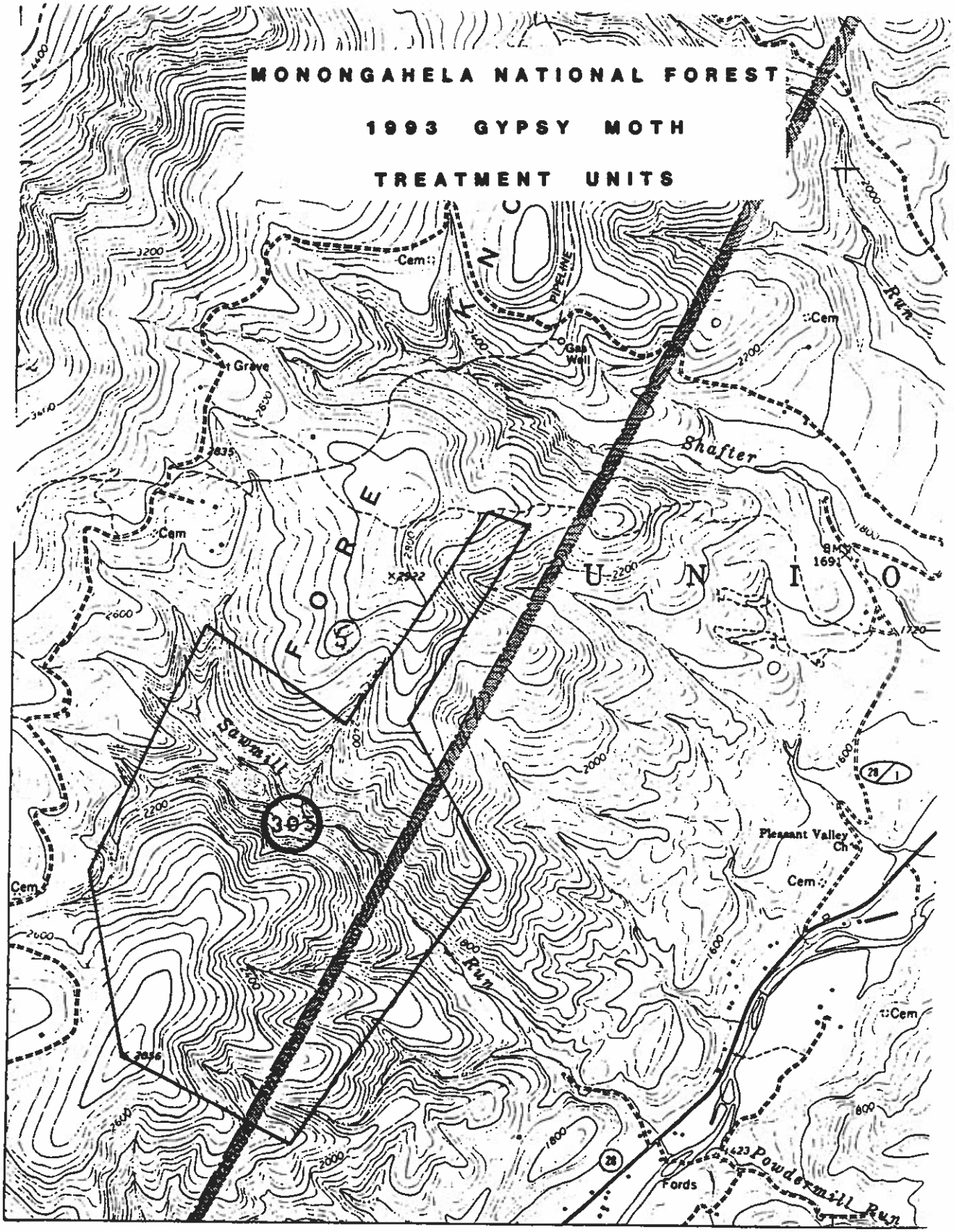
MONONGAHELA NATIONAL FOREST

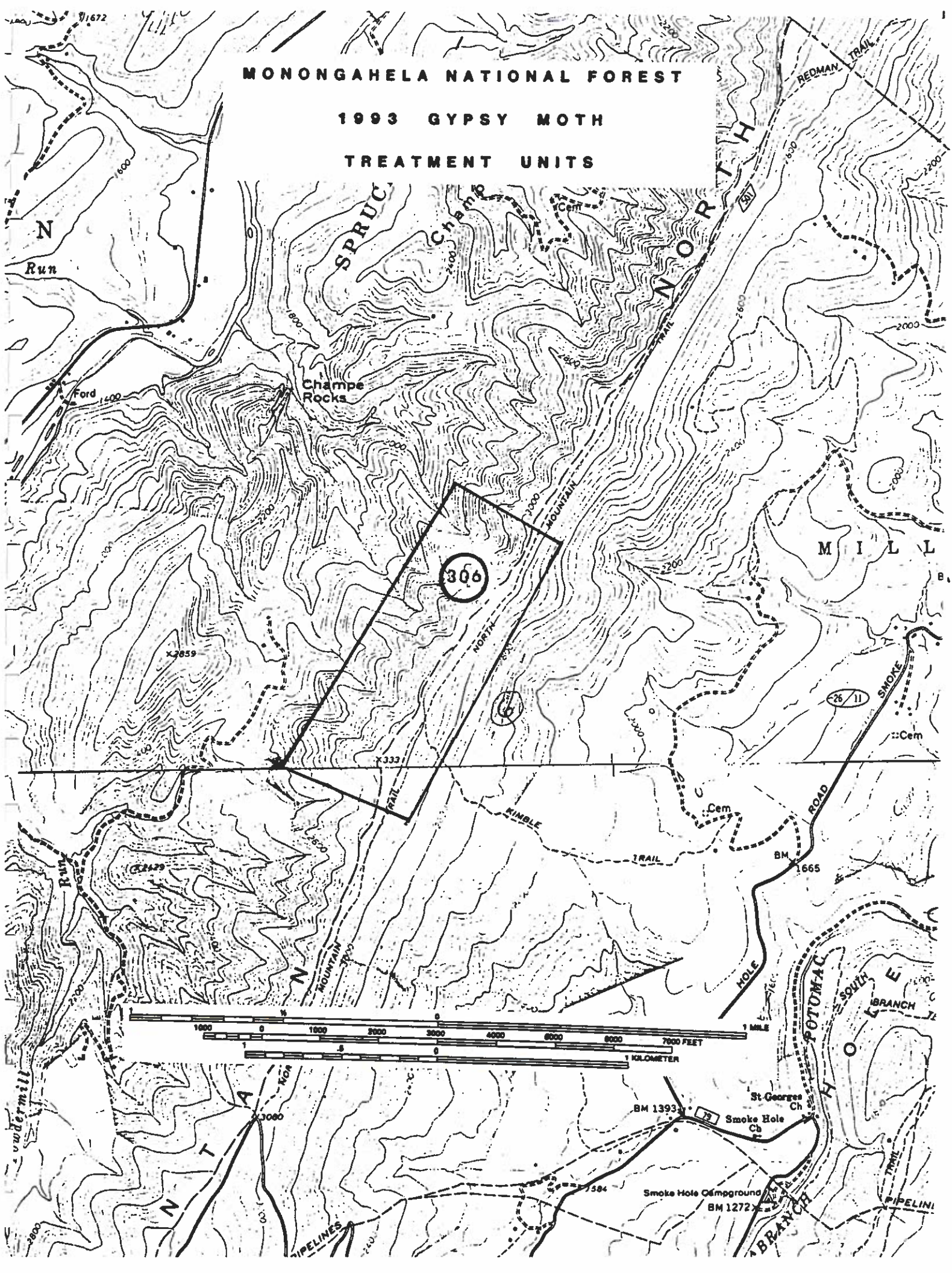
1993 GYPSY MOTH

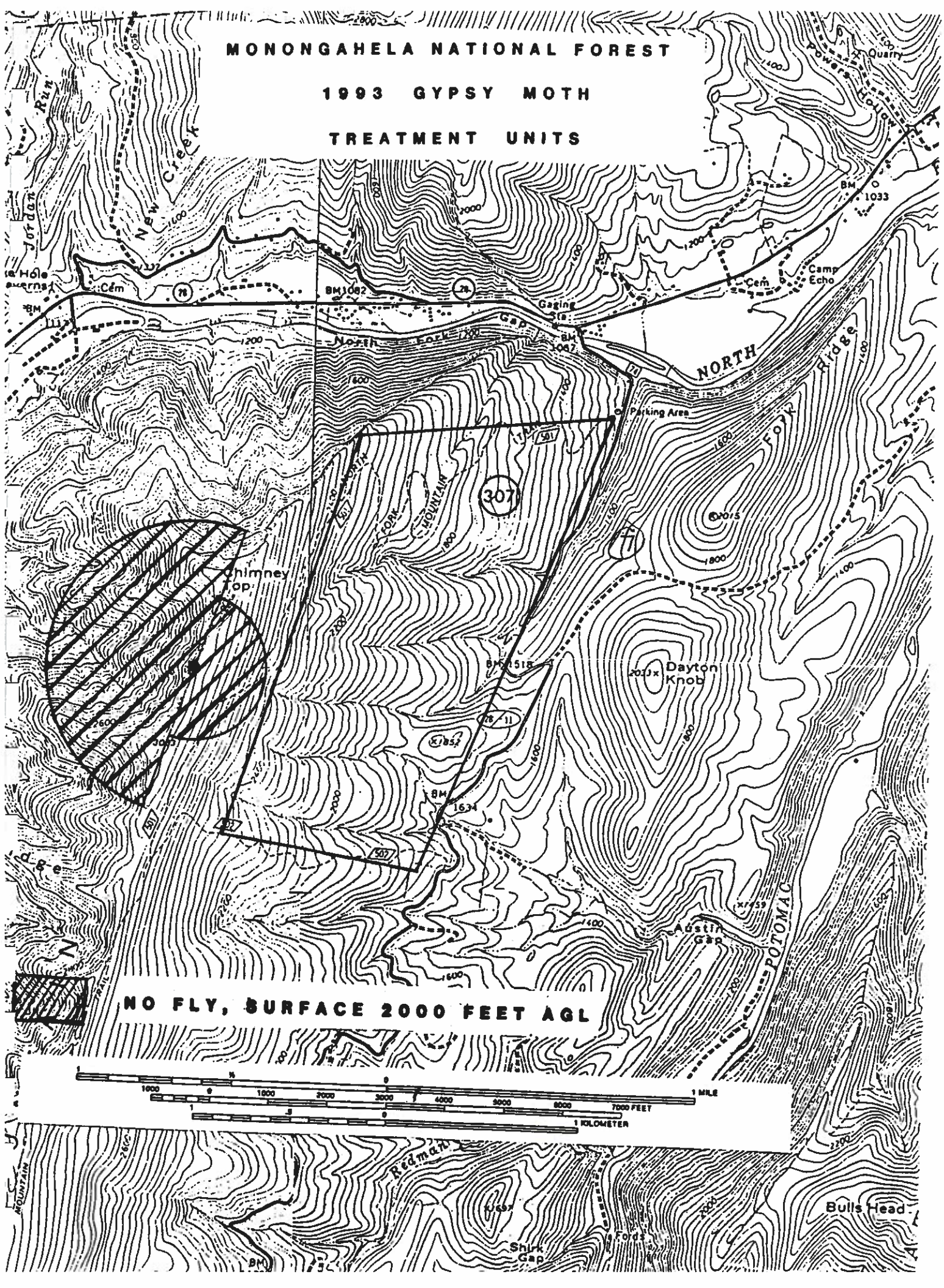
TREATMENT UNITS




MONONGAHELA NATIONAL FOREST
1993 GYPSY MOTH
TREATMENT UNITS
Shuckleford Run
Run
Cem
POTOMAC RIVER
BRANCH
Fords
Powdermill
MOUNTAIN
PIPELINE
Smoke
Cem
1 MILE
7920 FEET
1 KILOMETER
Platform Overlook

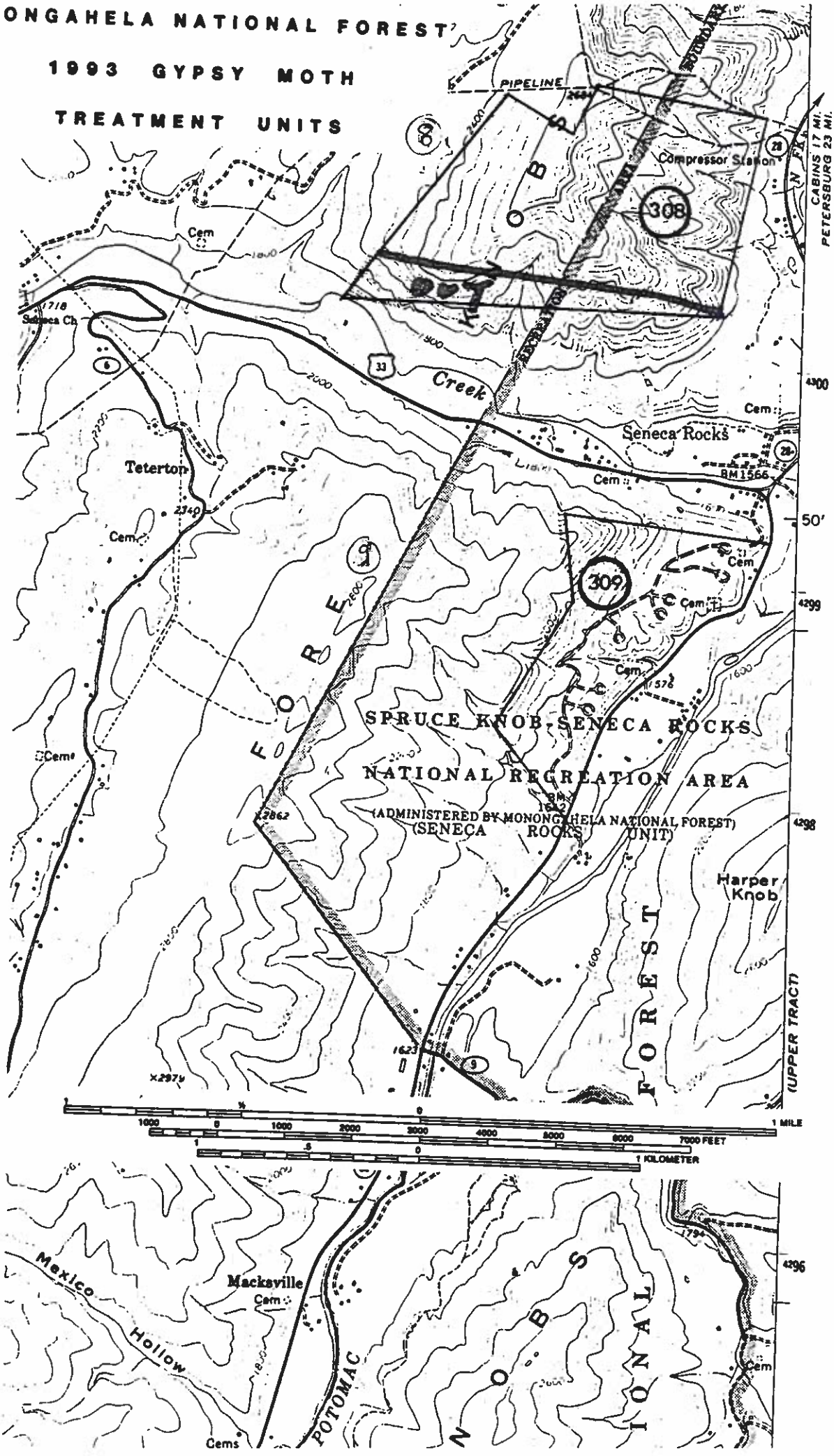

MONONGAHELA NATIONAL FOREST
1993 GYPSY MOTH
TREATMENT UNITS
FOREST
UNION
PIPELINE
Gas Well
Cem
Grave
Shafter Run
Sawmill Run
Pleasant Valley Ch
Fords
Powdermill Run
393
1 MILE
7000 FEET
1 KILOMETER

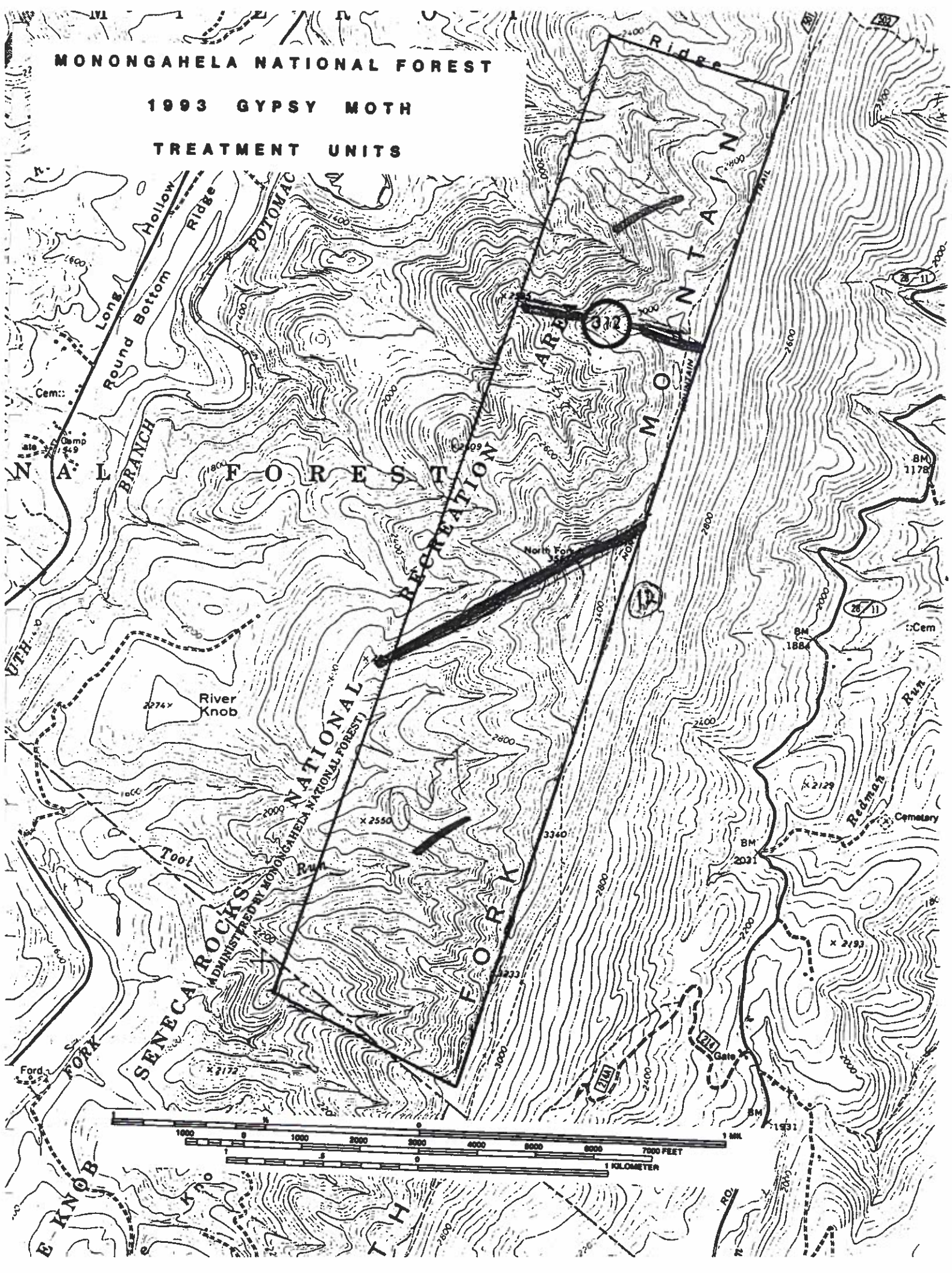

MONONGAHELA NATIONAL FOREST
1993 GYPSY MOTH
TREATMENT UNITS
306
6
Champe Rocks
Ford
SPRUCE
NORTH
MOUNTAIN
TRAIL
REDMAN
KIMBLE
ROAD
SMOKE HOLE
SOUTH BRANCH
POTOMAC
Smoke Hole Campground
St George Ch
Smoke Hole Ch
BM 1393
BM 1272
BM 1665
PIPELINES
1 MILE
7000 FEET
1 KILOMETER

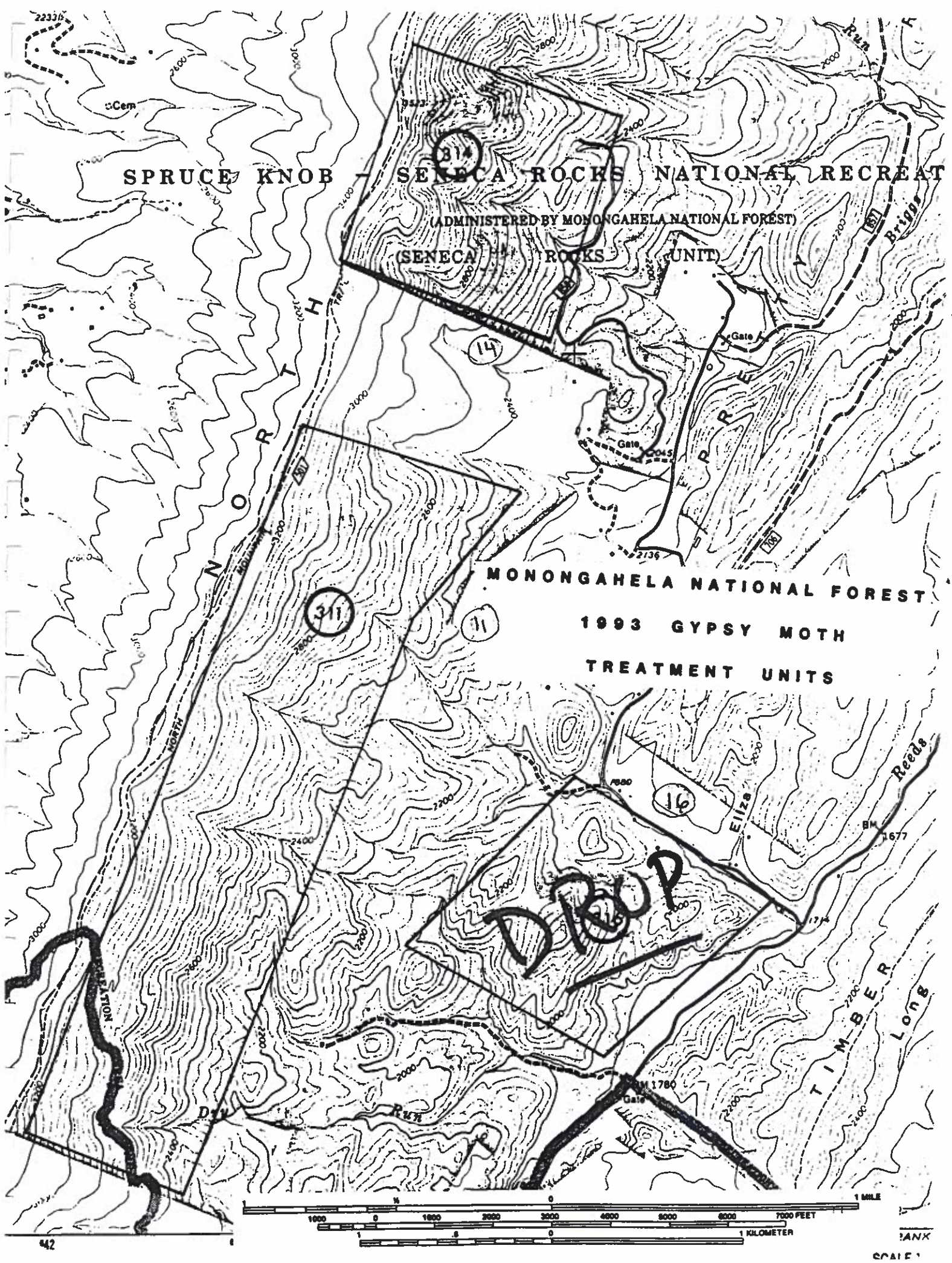

MONONGAHELA NATIONAL FOREST
1993 GYPSY MOTH
TREATMENT UNITS
Jordan Run
New Creek
Cem
BM 1082
Gaging Sta
North Fork Gap
BM 1087
NORTH FORK Ridge
Parking Area
Camp Echo
Cem
BM 1033
Powers Quarry
307
NORTH FORK MOUNTAIN
Chimney Top
BM 1518
Dayton Knob
BM 1634
Austin Gap
POTOMAC
NO FLY, SURFACE 2000 FEET AGL
1 MILE
7000 FEET
1 KILOMETER
Redman
Bulls Head
Shirk Gap
Fords

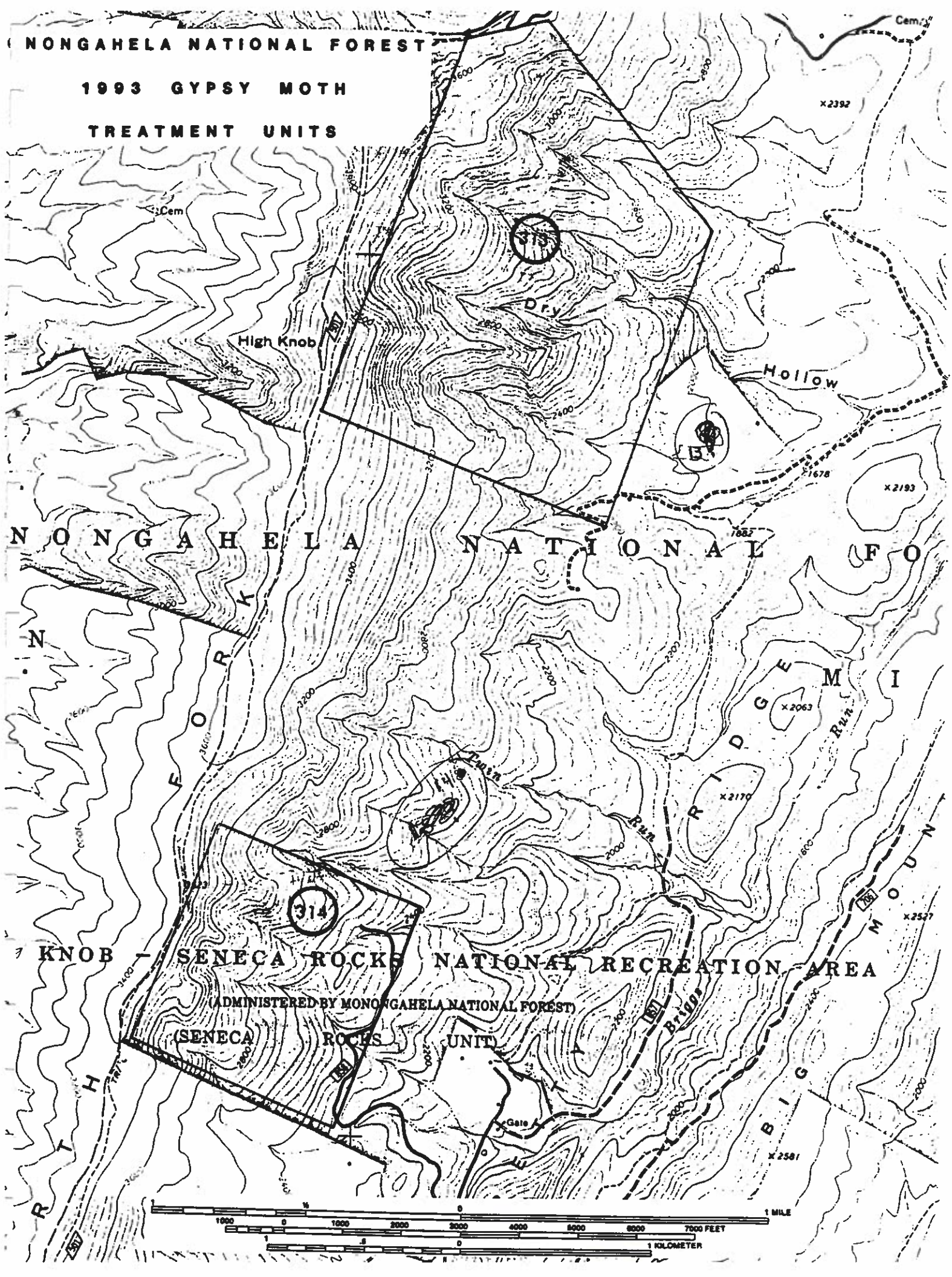
MONONGAHELA NATIONAL FOREST

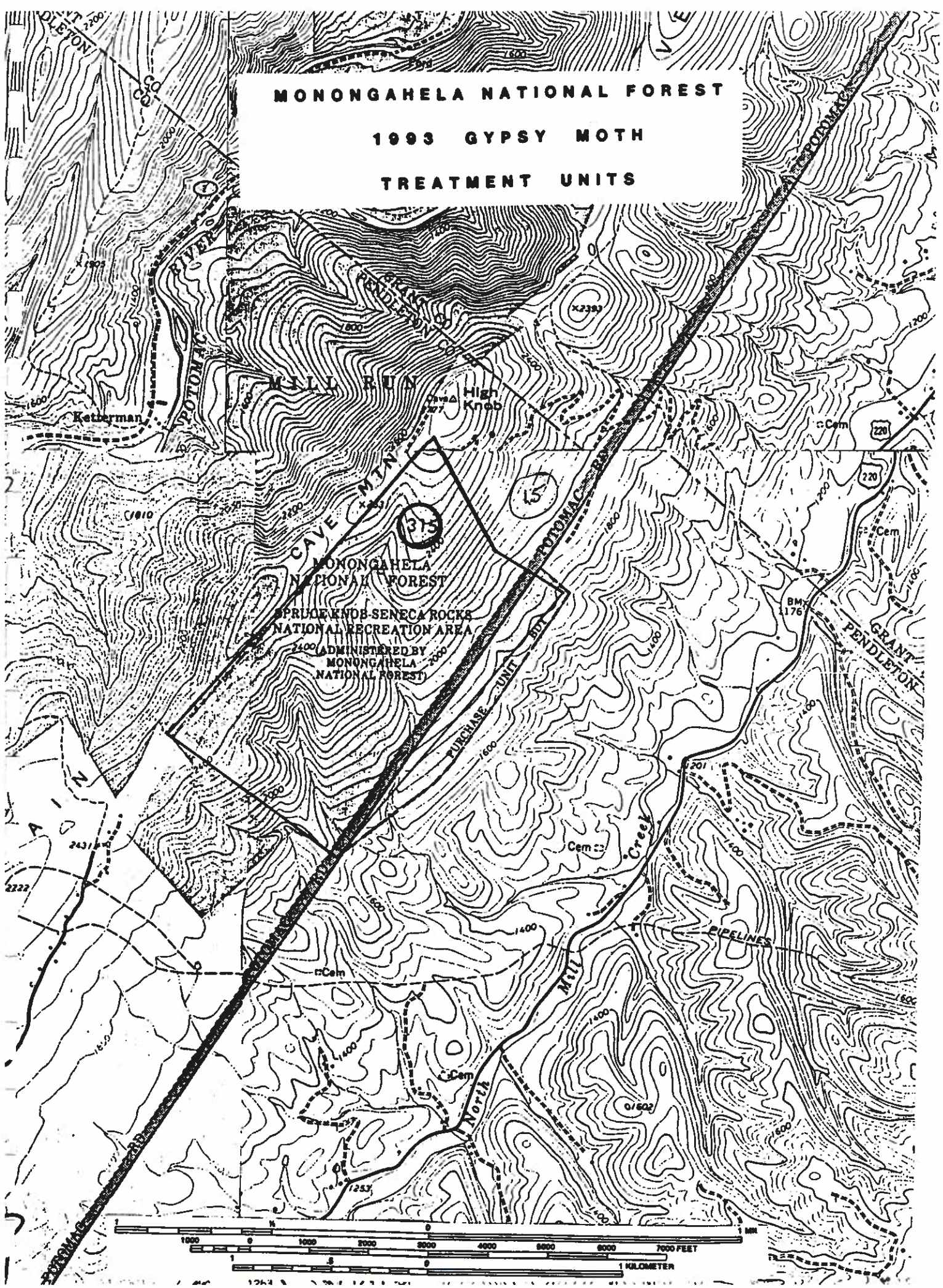
1993 GYPSY MOTH TREATMENT UNITS




MONONGAHELA NATIONAL FOREST
1993 GYPSY MOTH
TREATMENT UNITS
Ridge
Round Bottom
Lone
Hollow
Ridge
POTOMAC
BRANCH
Cem.
Camp
site
NATIONAL FOREST
SENECA ROCKS
(ADMINISTERED BY MONONGAHELA NATIONAL FOREST)
RECREATION AREA
MOUNTAIN
FORK
North Fork
River
Knob
2074
Tool
Run
Redman
Run
Cemetery
BM
1178
BM
1884
BM
2031
BM
1931
Gate
Ford
FORK
EKNOB
1000 0 1000 2000 3000 4000 5000 6000 7000 FEET
1 KILOMETER
1 MI.


SPRUCE KNOB – SENECA ROCKS NATIONAL RECREAT
(ADMINISTERED BY MONONGAHELA NATIONAL FOREST)
(SENECA ROCKS UNIT)
MONONGAHELA NATIONAL FOREST
1993 GYPSY MOTH
TREATMENT UNITS
NORTH FORK
MOUNTAIN
DROP
TIMBER
Briggs
Reeds
Ellza
Gate
Cem
Run
14
11
16
1677
1780
2136
2045
1 MILE
7000 FEET
1 KILOMETER


NONGAHELA NATIONAL FOREST
1993 GYPSY MOTH
TREATMENT UNITS
313
314
Dry
Hollow
High Knob
Cem
Cem
Run
Run
Run
Bridge
Gate
NONGAHELA NATIONAL FO
NORTH FORK
RIDGE
MOUN
KNOB – SENECA ROCKS NATIONAL RECREATION AREA
(ADMINISTERED BY MONONGAHELA NATIONAL FOREST)
(SENECA ROCKS UNIT)
1 MILE
7000 FEET
1 KILOMETER


MONONGAHELA NATIONAL FOREST
1993 GYPSY MOTH
TREATMENT UNITS
MILL RUN
High Knob
Ketterman
POTOMAC RIVER
CAVE MTN
MONONGAHELA NATIONAL FOREST
SPRUCE KNOB-SENECA ROCKS NATIONAL RECREATION AREA
(ADMINISTERED BY MONONGAHELA NATIONAL FOREST)
PURCHASE UNIT BDY
GRANT
PENDLETON
PIPELINES
North Mill Creek
Cem
220
BM 1176
0/602
1 MILE
7000 FEET
1 KILOMETER

APPENDIX B

1993 Gypsy Moth Suppression Project
Monongahela National Forest
Instructions for Field Personnel

I. INTRODUCTION

The objective of this project is to protect tree foliage in certain timber stands and recreational areas from severe defoliation by gypsy moth larvae. This will be accomplished by the aerial application of Btk and GYP applied from airplanes. Field crews have two general roles to play. First, they will be providing ground support and guidance for the pilots applying the spray, making sure that only the correct areas are sprayed. Second, they will be monitoring the results by collecting data before, during and after spraying.

A. PRE-SUPPRESSION

1) Monitoring Egg Hatch, Larval and Foliage Development

It is essential, especially when using Btk and GYP that the insecticide be applied at the correct time. Therefore, a major function of field personnel will be to visit accessible areas in or near or at elevations and aspects representative of spray blocks on a periodic basis to determine when the larvae and foliage will be at the proper stage to be treated, so that the applicator can be contacted and told to report to a previously designated airport.

Egg Hatch - Within a given stand, gypsy moth eggs, which are easily found in buff colored fuzzy masses around the size of a quarter on trees, will hatch in a period of around 1-2 weeks. This can be anywhere from mid- to late-April until early May depending upon, among other things, the latitude, aspect, exposure and elevation of the stand.

Larval Development - The gypsy moth sheds its larval skin several times while feeding. Each of the forms of the larvae are called "instars" and are numbered as L-1, L-2, L-3, L-4, L-5, and L-6. Male gypsy moths have five instars, females six. The spray must also be applied when the gypsy moth larvae are in the L-2 and L-3 instars.

While in the L-1 instar, gypsy moth larvae will "balloon", or suspend themselves on a silk thread to be blown by the wind, sometimes for long distances. They do not feed during the L-1, but disperse randomly as the wind will carry them. After landing on a suitable host, the L-1 sheds its skin and becomes an L-2 instar larva.

Most often the eggs hatch over a 7-10 day period so that there are L-1 through L-3 instar larvae present within the forest. If the hatch is too extended, there may still be unhatched eggs present. If a block is sprayed too early, these eggs may hatch and blow in after an area has been sprayed.

Once larvae have reached the 4th instar, they are too large to effectively suppress with Btk or GYP and have already done significant defoliation.

The gypsy moth head capsule comparator (available later) and the following chart should help to identify the various gypsy moth larval instars.

L-1 Instar	L-2 Instar	L-3 Instar
length - 1/8-1/4" color - black (tan when newly hatched)	length - 1/4-1/2" color - dark with some yellow and blue beginning to show	length - 1/2-1" color - blue spots with distinct red-yellow spots in the center

L-4 Instar	L-5 & L-6 Instars
length - 1 1/4-1 3/4" color - distinct 4 pairs of blue spots followed by 6 pairs of red spots with a yellow line down the middle	length - 1 3/4-3" color - same as 4th instar

Foliage Development - Leaves should be at least 30 percent of full expansion (surface area) before spray can be applied. If not, much of the material will fall through the canopy and not settle on leaves where it must be ingested to be effective. The actual leaf expansion should be compared with the worker's knowledge of the species or last year's leaves on the ground. Caution: If the stand was totally defoliated last year, the trees put out a second set of smaller leaves, so leaves on the ground may not represent those of normal size. The attached reference standard leaf expansion silhouettes should be used.

2) Corner Location

In conjunction with monitoring the egg hatch, larval and foliage development in a spray block, field personnel should locate certain pre-selected corners to be marked for the pilots. On the morning the block is to be sprayed, a helium balloon will be raised above the point to mark it for the pilot. With the short time available to mark these points, it is necessary to locate them ahead of time and flag the fastest and easiest route to get to the point to expedite the task when the actual spraying is to be done.

An easily followed line of single flags should lead from a distant point along a drivable road to a triple flag at the actual corner to be marked. Do not skimp on flagging! If a flag line is established before the foliage is out, remember that it will be more difficult to follow when the leaves are out in the morning darkness or twilight.

Each block will be assigned to an individual crew member or team for monitoring, corner location and spraying so that he or she will be familiar with the block. It is a good idea, if time allows, to visit each of the corners ahead of time to become more familiar with the routes into and between corners.

B. SUPPRESSION (May 10 earliest to June 10 latest estimated date)

This is the time when the actual spraying will be done, and is characterized by long hours early in the morning and often into the evening at an exhausting pace. The main responsibilities of field personnel will be to assist the pilots in locating and properly treatment the spray blocks, to monitor the conditions at the time of spray and their effects on the spray deposition and effectivenss, and to be on location to address the questions and concerns of the public during the spraying.

1) Corner Marking

Spraying will generally begin between 5:30 and 6:00 AM if conditions are favorable. This means that any balloons for marking corners must already be in place. Spray blocks may be ballooned the evening before the actual spraying is to take place. Balloons must be inflated at the vehicle and carried to the corner, unless small portable tanks are available. If only two or three balloon points are needed, and access is easy, it is often better to carry the balloons full to the marking site.

The balloon is tied to the end of a length of cotton kite string and raised carefully through the canopy or into a clearing as close as possible to the actual corner. If the balloon fails to work its way through the branches, then it must be pulled carefully back down to free it and allowed to try a new course. If the canopy is not cleared in several tries, pull it all the way down and try another spot. Once the balloon is above the canopy, another 30-50 feet of string should be released to raise it well above the treetops where it can easily be seen by the pilot. The other end is then tied to a fixed object near the ground (usually a branch) and the worker moves immediately to the next point. Once all the balloons are raised, monitoring data can be collected until the aircraft arrives to applythe spray.

Based on tests conducted by FHP personnel, it may be possible to put the balloons up the evening prior to spray. This would decrease the amount of ballooning needed during the predawn hours thus reducing the hazards presented while ballooning in the dark. This would also allow better monitoring of the application by field crews because they would not have to leave the area to mark the next spray block.

2) Ground Support

As many radios as possible will be distributed to field personnel. In this way, they can relay information to the field activities coordinator concerning which balloons are up at any time, when the block will be ready, any apparent problems such as people in the area, unfavorable conditions or unlocated markers, or merely if he is in the right locality. Ground personnel can likewise receive information from the pilots through the field activities coordinator concerning problems they see with spray conditions, hazards or with the application or instructions concerning where the pilot would like to spray next.

Aerial application at low altitudes above tree tops and rough country requires a good deal of concentration on the part of the pilot. Therefore, ground personnel will only have radio contact with the Operations Chief and aerial surveillence personnel, who will relay necessary information to the pilot. Ground personnel must be sure to use channel 1 for communications with each other, only using repeaters when contact cannot be made.

3) Treatment Monitoring Data Base Protocol and Form (see attached)

A detailed set of variables will be recorded for each spray block so that the effectiveness of the treatment can be determined and any problems can be traced to certain procedures or conditions and projects can be improved in the future. Many of these variables will be recorded ahead of time, others afterwards in the office, but certain ones must be noted on the block at the time of application. Specifically, these variables are:

a) foliage expansion of the primary (most prevalent) species on the block, in percent of surface area;

b) whether the foliage is dry or wet at the time of application; foliage is classified as wet when water drips from the leaves when touched;

c) larval development by instar (i.e, 60% 1st and 40% 2nd);

d) time of day to the nearest hour (1-12) and AM or PM;

e) wind speed in miles per hour, taken in an open area on or as near as possible to the block;

f) temperature in degrees fahrenheit;

g) percent relative humidity;

h) rainfall within the block within 4 hours of spraying exceeding 1/2 inch or an exceptionally hard downpour of more than 1/4 inch within 45 minutes of spraying;

i) estimated droplet size and density will be acquired during aircraft calibration by using spray cards on wire stands to keep the cards off the ground. Do not touch the face of the spray card as this will smear the droplets on the card. Cards should be dried and stored in large envelopes, and examined with the Swath Kit as soon as possible, either in the field or in the office according to standard procedures which FHP will provide;

j) number of cards in the block.

More detailed instructions and follow-up questions that need to be answered will be included with the data collection forms.

4) Contact with the Public

Despite our best efforts at public awareness, there will always be concerned citizens, sightseers and visitors who have questions concerning our operation. For this reason, field personnel should familiarize themselves with the objectives of the project, the insecticide used, other major aspects of the operation, and general information on the history and implications of the gypsy moth infestation. This information can be obtained from the general project work plan, from a planned orientation session for all project personnel, and from literature available from the FHP office. Some general literature may be handed out to personnel to carry in the vehicle for distribution to interested persons. As always, all the consideration and courtesy befitting a public employee should be shown when in contact with the public.

C. POST-SUPPRESSION (at various times from June through September)

1) Defoliation - The extend and intensity of defoliation caused by the gypsy moth will be determined within and immeditely adjacent to each spray block with a preliminary aerial sketchmapping/low oblique photo flight in late June and in greater detail using color infrared aerial photography which is planned for acquisition during the period of peak damage in late June to early July.

2) Egg hatch success - Collections will be made after the spraying has ended if the hatch observed during the pre-treatment sampling was less than 50 percent.

3) Egg mass density - An egg mass survey using 1/40-acre fixed radius plots will be conducted during September and October.

4) Post-Spray Monitoring Data - Any information that remains to be collected for the data base described in section B-3 above should be obtained now.

GYPSY MOTH LARVAL AND TREE FOLIAGE MONITORING PROCEDURES

1. Examine 100 egg masses for signs of hatch (look at a minimum of 10 trees; 10 egg masses maximum per tree).

If there is any hatch at all, mark yes, and go to #2. If no, go to #6.

2. Of the 100 egg masses examined, record as a percent, the number showing signs of hatch. Go to #3.

3. If larvae have begun to disperse record yes.

4. Of the 100 egg masses examined, record as a percent the number from which the larvae have dispersed.

5. Examine at least 100 larvae, estimate percentage in 1st, 2nd, and/or 3rd instar. (Use head capsule comparator for reference)

6. Estimate foliage development in the white oaks (white and chestnut): red oaks (red, black, and scarlet); and other species such as beech, maple, and others that are present in the plot.

LARVAL DEVELOPMENT - LEAF EXPANSION DATA SHEETS

Site: _____
Date: _____
Station Location: _____
Monitor(s): _____

1. Examine 100 egg masses (if less than 100, how many observed _____).

   a.) Number of egg masses showing signs of HATCH: _____ _____%

   b.) Number of egg masses showing signs of LARVAL DISPERSAL: _____ _____%

2. Examine 100 larvae (if less than 100, how many observed _____).

   a.) Number of 1st instar: _____ _____%

   b.) Number of 2nd instar: _____ _____%

   c.) Number of 3rd instar: _____ _____%

3. Tree crown observations

Tree Species	Buds Closed	Buds Swelling	Buds Breaking	Leaf expansion <25%	25-50%	>50%
White Oak						
Red Oak						
Other (list)						

Comments:

Identifying Gypsy Moth Early Larval Instars

by M.L. McManus and D. Twardus

United States
Department of
Agriculture

Forest Service

**Northeastern Forest
Experiment Station**

Northeastern Area

There are 4 principal characteristics to use in distinguishing the first 3 larval instars of gypsy moth under field conditions:

1. **body size**
2. **color** on the **upper body surface**
3. **color** of **head capsule**
4. **width** of **head capsule** in relation to **width** of the **body**

The 1st instar.

Newly hatched 1st instar larvae are buff-colored but turn black within several hours (Figure 1, left.). The body length of this instar ranges from 3 to 5 mm. The head capsule is always black. As the larvae prepare to molt into the 2nd instar, their body color lightens to a characteristic greasy appearance (Figure 1, right.).

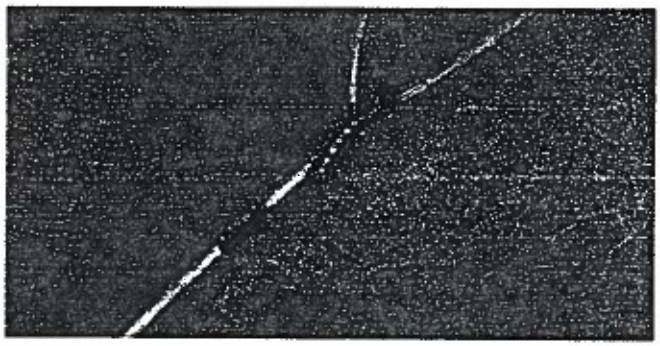


Figure 1.

The 2nd instar.

Figure 2 shows a comparison of a late 1st instar, just prior to molting (left), with a newly molted 2nd instar (right). Note that though size is similar, the early 2nd instar is nearly black and irregularly shaped yellow marks are visible on the upper body surface. The head capsule is black and the body length of this instar can vary from 5.5 to 11 mm.

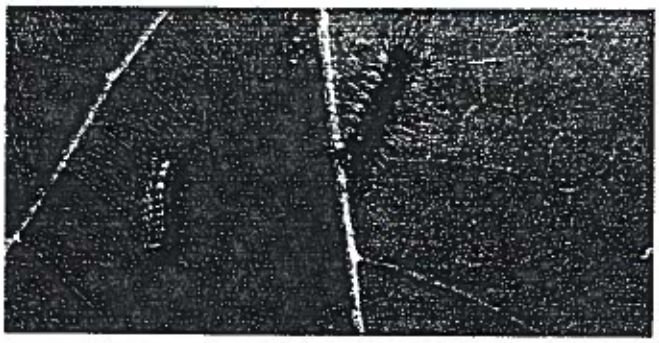


Figure 2.

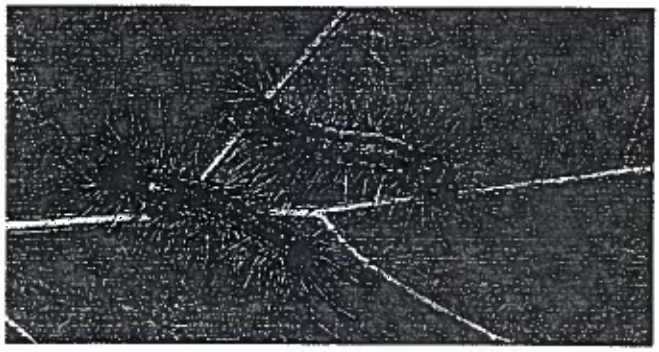


Figure 3.

The 3rd instar.

Coloration becomes more pronounced on the 3rd instar larva. Figure 3 illustrates a comparison of a 2nd instar preparing to molt (right) and a newly emerged 3rd instar (left). The head capsule is black but the orange, nearly crown-shaped markings on the upper body surface of the 3rd instar larva are distinctive. Notice, also that the head capsule of the newly molted 3rd instar is as wide as the body. Within each instar, as the larvae feed, they grow in length and width — however, the size of the head capsule does not change. Therefore, as larvae approach the point where they molt into the next instar, the head capsule appears much smaller in relation to the width of the body. The body length of the 3rd instar varies from 10 to 15.5 mm.

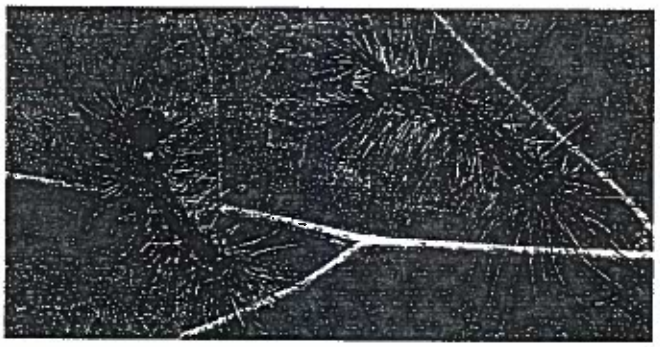


Figure 4.

The 4th instar.

Figure 4 illustrates the dramatic change in larval appearance of the 4th instar. The head capsule is now yellow mottled with black markings (appear as eye spots). The markings on the body surface are distinctively 5 pairs of blue spots followed by six pairs of brick red spots. Body length varies from 15 to 24mm.

NA-FB/P-32
September 1989

Field Guide for Treatment Monitoring,
produced by D. Twardus and R. Gossard,
USDA, Forest Service, State and Private Forestry,
NA. August 1990.

FULLY EXPANDED WHITE OAK LEAF

GYPSY MOTH TREATMENT MONITORING

A. BLOCK INFORMATION

STATE	COUNTY	BLOCK NUMBER	BLOCK ACRES	LOWEST ELEVATION (FT.)	HIGHEST ELEVATION (FT.)	ASPECT	OWNERSHIP
00 01 02 03 04 05 06 07 08 09	000 111 222 333 444 555 666 777 888 999	0000 1111 2222 3333 4444 5555 6666 7777 8888 9999	00000 11111 22222 33333 44444 55555 66666 77777 88888 99999	1 0-500 2 501-1000 3 1001-2000 4 2001+	1 0-500 2 501-1000 3 1001-2000 4 2001+	N NORTH E EAST S SOUTH W WEST N NONE	P PRIVATE S STATE N NATIONAL FOREST O OTHER

B. PRE-TREATMENT SURVEY

WAS BLOCK TREATED LAST YEAR?	EGG MASS PER ACRE	EGG MASS LENGTH IN (mm)	SURVEY TYPE	NO. OF WALKS/ PLOTS	MARKING INSTRUCTIONS	POPULATION QUALITY	AVG. PCT. EGG MASS VIABILITY	OLD EGG MASSES AS A PERCENT OF TOTAL
Y YES N NO U UNK	00000 11111 22222 33333 44444 55555 66666 77777 88888 99999	00 11 22 33 44 55 66 77 88 99	5 5 MINUTE WALK F FIXED F FV O OTHER	000 111 222 333 444 555 666 777 888 999	• USE A NO. 2 PENCIL ONLY • MAKE ALL ERASURES CLEANLY • DO NOT MAKE STRAY MARKS CORRECT MARK INCORRECT MARKS		000 111 222 333 444 555 666 777 888 999	1 0 2 <5 3 5-10 4 11-20 5 21-50 6 >50

C. ON-SITE MONITORING

MATERIAL BEING APPLIED	CODE	IF BT	BIU	APP. RATE OZ/AC.	MULTI APPL	APPLICATION START DATE MO DAY YR	MOST OF APPLICATION OCCURRED DURING (SELECT ONE)	AIRCRAFT TAIL NUMBER	AIRCRAFT TAIL NUMBER
D DIMILIN B BT O OTHER, SPECIFY IN COMMENTS	0 1 2 3 4 5 6 7 8 9	D DILUTED U UNDILUTED	00 11 22 33 44 55 66 77 88 99	000 111 222 333 444 555 666 777 888 999	N 1 2 3	00 01 02 03 04 05 06 07 08 09 00 11 22 33 44 55 66 77 88 99 9	1 DAWN - 9:00 am 2 9:01 am - 12:00 noon 3 12:01 pm - 3:00 pm 4 3:01 pm - 6:00 pm 5 6:01 pm - DUSK 6 ALL DAY	N 0000 1111 2222 3333 4444 5555 6666 7777 8888 9999 AAAA BBBB CCCC DDDD EEEE FFFF GGGG HHHH IIII JJJJ KKKK LLLL MMMM NNNN OOOO PPPP QQQQ RRRR SSSS TTTT UUUU VVVV WWWW XXXX YYYY ZZZZ	N 0000 1111 2222 3333 4444 5555 6666 7777 8888 9999 AAAA BBBB CCCC DDDD EEEE FFFF GGGG HHHH IIII JJJJ KKKK LLLL MMMM NNNN OOOO PPPP QQQQ RRRR SSSS TTTT UUUU VVVV WWWW XXXX YYYY ZZZZ

PCT. DEF. ON PRINCIPAL SPECIES	PERCENT FOLIAGE EXPANSION (OAKS)	FOLIAGE CONDITION	PREDOMINANT LARVAL INSTAR	WIND SPEED MPH	TEMP. DEG. F.	PERCENT RELATIVE HUMIDITY	SPRAY DEPOSIT OBSERVED TO BE	MORE THAN 1/2" OF RAIN WITHIN 24 HOURS
000 111 222 333 444 555 666 777 888 999	000 111 222 333 444 555 666 777 888 999	W WET D DRY U UKN	1 1ST 2 2ND 3 3RD 4 4TH 5 5TH 6 6TH	00 11 22 33 44 55 66 77 88 99	000 111 222 333 444 555 666 777 888 999	000 111 222 333 444 555 666 777 888 999	G GOOD P POOR U UNKN	Y YES N NO U UNKN

COMMENTS: Y

APPENDIX C

FOREST HEALTH PROTECTION
MORGANTOWN, WV, FIELD OFFICE
HEALTH AND SAFETY PLAN
1993

In order to ensure adequate protection for Forest Service employees, Forest Service property, and the visiting public, and in order to promote healthy life styles that will lead to the mental and physical well-being of all employees and their families, the attached health and safety program guidelines were developed for integration into all FHP, Morgantown Field Office activities.

The goals of this health and safety program are to:

- Eliminate all avoidable accidents;
- Create and maintain a positive attitude in all employees toward personal health and safety;
- Promote safety awareness, responsibility, and accountability;
- Identify and eliminate hazardous conditions wherever possible;
- Promote the wellness of employees and their family members; and
- Establish a positive award system that will recognize employees with superior ratings and/or accomplishments in the field of safety.

I. SAFETY AWARENESS AND RESPONSIBILITY

A. Supervisor Responsibilities

1. Prepare Job Hazard Analysis (JHA) and distribute copy to each employee prior to starting project work. Use form FS-6700-7, and include applicable Material Safety Data Sheets (MSDS's). Review analysis with work crew prior to starting job and as needed. Update and revise JHA if necessary.
2. Have employees initial applicable Job Hazard Analysis prior to beginning each project.
3. Hold tailgate safety sessions weekly or more frequently if needed. Document sessions and submit copy to Office Manager.
4. Provide safety training for each employee needed for assigned duties. Include initial and refresher training.
5. Ensure safe and proper use of all project supplies and equipment. Inspect project areas before, during and immediately following work activities.
6. Be sure that applicable safety equipment and clothing is provided and utilized by each employee during project activities.
7. Ensure safe and proper storage of all project supples and equipment both on and off the job site. Include inspection of project vehicles.
8. Encourage safety suggestions from all co-workers. Address and correct all safety deficiencies in work environment and employees as soon as they are noticed.

9. Prepare safety flash for any near miss, potential hazard, or accident.

10. Conduct initial investigation and document results of any accident, injury, and/or near misses involving his/her employee in order to inform Office Manager of situation.

11. Encourage employee participation in wellness program.

12. Maintain, keep current, and utilize Health and Safety Code (HSC) Handbook (FSH 6709.11) and post supplements promptly.

B. Employee Responsibilities

1. Use all safety equipment provided and follow proper safety procedures.

2. Develop safety awareness in work environment by improving safety methods and by encouraging fellow employees to be safe. Take corrective action on hazardous situations when observed.

3. Promptly report all accidents, injuries, and/or near misses to supervisor.

4. Prior to vehicle use, familiarize self with vehicle condition and location of safety equipment.

5. Be sure that all work instructions are completely understood before beginning work.

6. Maintain appropriate level of physical fitness to accomplish assigned tasks.

7. Maintain personal and vehicular first aid kits, fire extinguishers, and other emergency equipment.

C. Office Mangager Responsibilities

1. Annually update and revise Health and Safety Plan.

2. Review accidents and determine avoidability.

3. Review, respond to, and file all safety correspondence.

4. Provide safety incentives. Recognize exemplary performance and action of employees with appropriate awards and/or certificates.

5. Provide safety and wellness training for Forest Service employees (e.g. CPR, Standard First Aid, etc.).

6. Develop Office Safety Budget.

7. Ensure that supervisors inform employees of safety and health hazards associated with their workplaces and jobs.

II. ACCIDENT REPORTING PROCEDURES

A. All Accidents

1. An employee must report any accident involving property damage, physical injury, and/or illness to their supervisor on the same day as the occurrence.

2. The supervisor shall immediately notify the Office Manager of any reported accident.

3. Immediately upon the occurrence of an accident, the supervisor will conduct an initial investigation in order to assess and document the situation using an Accident Information Form. This form should include the what, who, when, where, how and why of the incident. This form is to accompany the initial accident report and is to be as complete and thorough as possible.

4. Within 24 hours of occurrence, the supervisor or Office Manager will notify the Morgantown Office of the incident.

B. Motor Vehicle Accidents

1. Within five working days of the accident, required forms (SF-91, SF-91A, SF-94, the Accident Investigation Form) and damage estimates will be completed and submitted to the Office Manager.

C. Personal Injury Accidents

1. In case of emergency illness or injury, employee(s) may go directly to a doctor or hospital. The supervisor or Office Manager must then be notified immediately in order to obtain necessary authorization.

2. For non-emergency illness or injury, the supervisor or employee must report to the Office Manager in order that appropriate arrangements can be made for proper medical care. Utilize APMC where available.

3. Within two working days of the injury or illness, required forms (CA-1, CA-2, CA-16, CA-17, HCFA 1500, Accident Investigation Form, FS-6100-16) will be completed and submitted to the Office Manager.

VEHICLE OPERATOR RESPONSIBILITIES

Each driver or operator is responsible for completing a monthly safety and preventive maintenance check on their assigned vehicle. Completed reports are to be submitted to the Office Manager. Item I.B-7 discusses emergency safety equipment. The following items should be checked daily or as often as needed:

Pre-Operation Condition Check:

Tire inflation, cuts, breaks, or excessive uneven wear
Possible fuel, oil, and coolant leaks
Crankcase oil levels
Coolant levels, antifreeze level
Proper operation of all lights and signal devices

Cleanliness of glass, light lenses, and windshield washer system
Adjustment of mirrors
Horn
Brakes, including emergency brake
Jack, lug wrench, tire chains, and accessories
Loose bolts and nuts
Loose items in cab

During Operation Check:

Foot and hand brakes
Clutch
Transmission
Transfer case
Engine and controls
Instruments
Steering gear
Running gear
Body integrity

All personnel who operate government owned or leased equipment are required to exercise the same caution when driving government vehicles we assume would be given while driving personal vehicles.

HEALTH AND SAFETY PLAN
1993 SPRAY PROJECT
MONONGAHELA NATIONAL FOREST

INTRODUCTION

Regardless of how thorough this safety plan may appear, each person on the project should be constantly alert to detect any unsafe practices and correct them immediately.

GENERAL SAFETY

The field coordinator is responsible for ensuring that workers are: (1) acquainted with the hazards of the natural conditions; and (2) use protective clothing and devices that are prescribed on the project or required by the Forest Service.

The Job Hazard Analysis assists in identifying the hazards on the project and refers to specific sections of the Health and Safety Code Handbook for guidance in ways to eliminate, or at least minimize them.

FOOT TRAVEL

Field crews will constantly be traveling by foot to reach spray blocks and put up balloons; and this may be done at near dark conditions early in the morning. Flashlights or headlamps should be used where necessary.

Blisters - Break in boots before using them heavily. Keep laces tight and wear heavy socks. Treat broken blisters to avoid infection.

Fatique, Exhaustion - Workers should be in good shape. If not, some form of exercise should be scheduled before the field season starts. When in the field, minimize heavy supplies being carried where possible, and divide work so as to minimize any extra unnecessary trips.

Steep Slopes, Wet Logs and Rocks - Watch where you step and don't hurry in hazardous terrain. Sturdy work boots should be worn with a minimum height of 8" and Vibram type soles.

Disorientation in the Woods - Note obvious landmarks and directions and familiarize yourself with the maps before entering the area. Use the maps, compasses and radio if necessary to keep track of where you are. If you become disoriented, don't panic. Find a road or, as a last resort, a drainage and follow it until you can find where you are and orient yourself to the map.

Walking through Brush - Be alert for branch stubs and sticks and wear a hard hat and eye protection. Long sleeve shirts are recommended in areas with briars or other thorny vegetation, if it is higher than thigh level.

Working During Spring Turkey Hunting - Crew members should not wear black or red clothing. Orange safety vests will be worn whenever a field crew member is working in the woods away from the vehicle.

Barbed Wire - Go over a fence, where possible by using two hands to hold down the fence while stepping over. When it is necessary to go through a barbed wire fence, remove your vest and any loose equipment, then hold the wire down at a level that is comfortable to crawl through. If you are with another person, have that person hold the strands of wire apart while you cross. Puncture wounds can easily become infected or cause tetanus, so treat them seriously.

VEHICLE TRAVEL AND WEATHER

Field crews will be doing a lot of driving from one area to the next. Operators are responsible for driving defensively to avoid accident situations created by the mistakes of others, or by weather and road conditions. (FS Health and Safety Code FSH 6709.11:2-1, p. 11 and for additional information, see Driver-operator Handbook, FSH 7109.18, and FSM 7136).

Vehicle Travel - Always use defensive driving techniques and limit speeds to those appropriate to the vehicle and the road you are traveling. Drive only on roads that are appropriate for the vehicle you are driving. You won't save time if you get stuck or have an accident to avoid a half mile walk. Wear your seat belts at all times while the vehicle is in motion. Always use your lights while traveling dirt roads and when operating windshield wipers.

Weather - Keep an eye on forecasts and changing weather conditions to avoid being caught in a bad situation. Exercise additional caution driving in bad weather conditions; and always be sure somebody knows where you are working.

BIOLOGICAL HAZARDS

All personnel involved with this project will be confronted with this type of hazard and must be aware of the following elements:

Stinging Insects, Poison Ivy - Wear long clothing and watch where you are walking, sitting or reaching. Ointments can be used to lessen the effects of poison ivy. Make your coworkers aware of any allergies you have to bee stings and make sure they know where your antidote is kept. Keep an eye out for wasps constructing nests and stay clear of them.

Biting Insects - Black flies and later, mosquitos will be the major pests on this project. This nuisance can be minimized by wearing long clothing and using insect repellant.

Poisonous Snakes - Watch out for rattlesnakes and copperheads in the spring on warm exposed spots, especially along timber roads, or stream banks. Wear high boots and chaps or heavy, loose fitting pants, and look before stepping over logs or climbing hand over hand on rocks. Copperheads require special care because they are well camoflaged and do not have any warning mechanism like a rattlesnake. Field personnel should carry a snake bite kit and be familiar with its use. In the event of a bite, remain calm and take the most direct route back to the vehicle with a partner so he/she can drive the bite victim to the closest medical facility.

Wild Animals - Give wild animals a wide berth, particularly if they have young nearby. It is also possible that the wildlife you come upon may have rabies; so don't go near or attempt to touch animals.

Allergy to Gypsy Moth - Contact with urticating hairs and scales from gypsy moths are unavoidable working in epidemic populations, and are often not known about until a person develops symptoms of an allergic response. While normally not serious, the possibility should be made clear to employees. An allergy usually manifests itself as a red rash and can be minimized by wearing long clothing and protecting the collar area. Treat the rash with antihistamine lotion.

INSECTICIDES

The spray materials you may come into contact with have low or no toxicity to humans, but unnecessary contact with these materials should be avoided. Although Btk is non-toxic to humans, contaminates, such as other bacteria, have been known to cause infections in persons handling the material, through contact with the eyes or open wounds. Forest Service workers will not be handling the material, and should avoid direct contact with large concentrations of Btk.

1. Bacillus thuringiensis (Btk)

Mode of Action - Bacillus thuringiensis, commonly known as Bt, is a naturally occurring, spore-forming, crystal-producing, rod-shaped bacterium. There are numerous varieties of Bt; however, the variety that is registered for control of various agricultural and forest Lepidoptera, including the gypsy moth is Bacillus thuringiensis Berliner, variety Kurstaki, strains HD-1 and NRD-12. When these strains begin to form spores, they produce protein crystalline bodies that contain delta-endotoxin, a natural substance that is toxic to Lepidopterous insects. Commercial formulations of Bt contain the spores and crystals as their primary ingredient. When ingested by larvae, the crystals dissolve in the gut, releasing the toxic protein. The protein breaks down the lining of the gut, causing the insect to cease feeding. The bacterium then invades the internal tissues of the larvae, multiples rapidly and causes organ disintegration. Death of the larva is caused by a combination of bacterial infection and starvation, usually within 7 to 10 days.

Fate in the Environment - Studies indicate that Bt spores will persist in soil for long periods (over 3 months), depending on the soil type, soil flora and other factors such as pH, moisture and radiation. Formulations of Bt that are presently available can remain viable on foliage for 4 to 7 days.

Toxicology - Biological insecticides must be ingested by the gypsy moth larvae to be effective; therefore, larval mortality is not immediate. Larvae generally cease feeding after ingestion of Bt; however, mortality may not occur until several days to more than a week later. More than one application of Bt may be needed in certain situations to achieve management objectives. Generally speaking, proper Bt application can be expected to reduce gypsy moth populations by at least 70 percent and achieve 80 percent or greater foliage protection. A word of caution on the potency of the various formulations of Bt is warranted: Due to the processes used in producing this material, there is a + or - 20 percent variation in potency.

In the formulations used for gypsy moth management, Bt is a lepidoptera-specific insecticide; therefore, only insects in the Order Lepidoptera (butterflies and moths) are affected by it. While lepidopterous larvae other than the gypsy moth may be affected, there will be no effect on insects such as bees.

2. Gypsy Moth Nucleopolydedrosis Virus (NPV)

Mode of Action - NPV is species specific to the gypsy moth. It liquifies the body of infected larvae.

No known human health risks exist for the NPV product, GYPCHEK. A comprehensive review of GYPCHEK is attached. The EPA Registration Label for GYPCHEK and Material Safety Data Sheets for GYPCHEK and for the tank mix ingredients Lignosite AN and Bond have been attached to this appendix.

Additional information on avoiding job hazards can be obtained from the Health and Safety Code Handbook (FSH 6709.11) and will be read by all employees. A list of common job hazards is given on the following form with the pages on which information may be located.

JOB HAZARD	HSC HANDBOOK PAGES
Vehicle Traveling	11 - 21
Accident Reporting	4 - 8
Foot Travel	36 - 37
Back-Country Travel	37 - 39
Protective Equipment & Clothing	61 - 63, and 127 - 129
Plant and Animal Hazards	262 - 267
Environmental Hazards	267 - 271

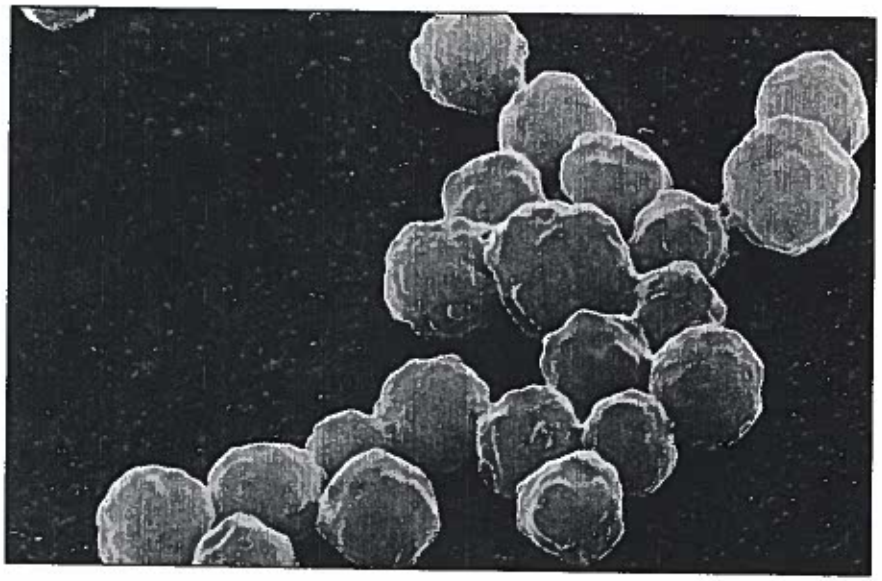
AIPM

TECHNOLOGY
TRANSFER

GYPCHEK

The Gypsy Moth Nucleopolyhedrosis Virus Product

Richard Reardon
John Podgwaite



NA-TP-02-92
April 1992

Appalachian Integrated Pest Management

USDA Forest Service Northeastern Area

The Gypsy Moth Nucleopolyhedrosis Virus Product

Richard Reardon[1] and John Podgwaite[2]

The gypsy moth, *Lymantria dispar* Linnaeus, is a serious defoliator of broadleaved forests in eastern North America. Populations of this insect pest undergo periodic outbreaks to extremely high densities that result in widespread defoliation to an average of 5.0 million forested acres per year. In addition, this pest defoliates trees and shrubs in residential areas and when infestations are heavy, creates a nuisance to residents. Since the introduction of the gypsy moth and its associated infectious diseases into the Boston area in 1869, it has spread to the south and west and continues to spread at the rate of approximately twelve miles per year (Figure 1).

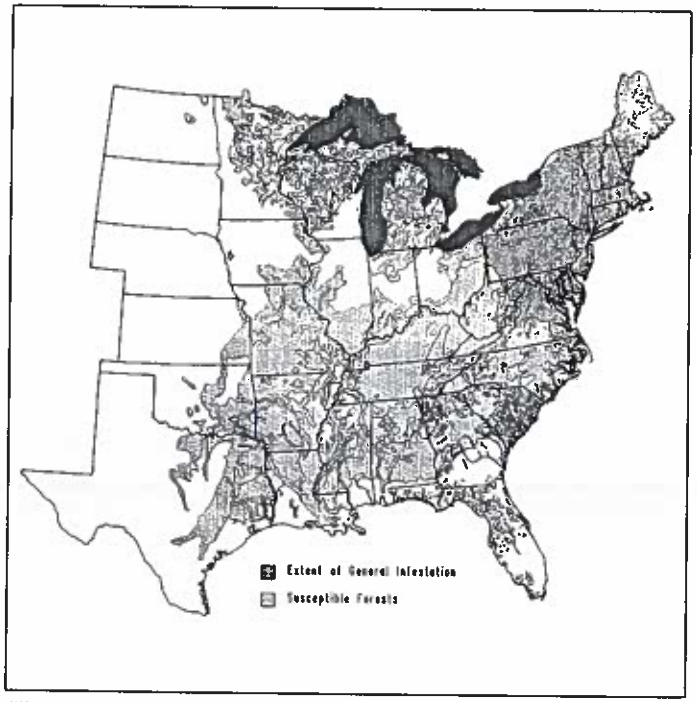


Figure 1. Distribution of the Gypsy Moth and Susceptible Oak-Type Forests of the Eastern United States

[1] USDA, Forest Service, Northeastern Area, State and Private Forestry, Morgantown, WV 26505.

[2] USDA, Forest Service, Center for Biological Control of Northeastern Forest Insects and Diseases, Hamden, CT 06514.

incidences of the parasites *Cotesia melanoscelus* and *Parasetigena agilis* and further, Raimo et al. (1977), showed that *Cotesia* females could transmit NPV from infected to healthy gypsy moth larvae. In many dense gypsy moth populations, the virus kills up to 90 percent of the larvae and reduces populations to levels where they cause only minimal defoliation and tree damage in the following year.

In the late 1950's, the USDA Forest Service began to explore the feasibility of developing these naturally occurring diseases as

Figure 3. The Gypsy Moth Nucleopolyhedrosis Virus Product, GYPCHEK

alternatives to chemical insecticides for suppressing gypsy moth populations. In April 1978, following several years of research and development, the gypsy moth nucleopolyhedrosis virus product GYPCHEK (Figure 3) was registered by the Environmental Protection Agency (EPA) as a general use pesticide for aerial and ground application to control gypsy moth. Current labelling requires that the product be used under Forest Service supervision. Today, GYPCHEK is one of two biological insecticides (the other being *Bacillus thuringiensis kurstaki*) currently registered for use against gypsy moth. The Hamden strain of the gypsy moth NPV (isolated from a Connecticut population) is the active ingredient in the currently registered product.

USDA Animal and Plant Health Inspection Service/Forest Service cooperative project yielding 5,000-7,000 acre equivalents (AE) annually at a cost of $20/AE. Tank mix ingredients add another $2.00/AE. In general, it takes about 500 to 1,000 infected larvae to produce enough **GYPCHEK** to treat one acre twice.

The recent successful field trials with **GYPCHEK** and the continued spread of the gypsy moth to the south and west, and the environmental concerns over the effects of both *Bt* and Dimilin (the insect growth regulator) on selected non-target organisms have stimulated commercial interests. Recently, several companies have attempted to phase **GYPCHEK** into commercial production using *in vivo* production. Unfortunately, their attempts have been unsuccessful although another large United States-based company which currently produces numerous insecticides for agricultural use is extremely interested. This same company is also continuing efforts for production of **GYPCHEK** using cell culture *(in vitro)* systems.

Also, additional strains of the virus (e.g., Abington strain developed by the Agricultural Research Service) have been identified and the search is continuing for more virulent strains. At the present time, there are no data that indicate that any recently identified strains are more efficacious in the field than the strain (Hamden) used in the current **GYPCHEK** product.

Future field efforts will focus on the evaluation of **GYPCHEK** against low density populations (less than 100 EM/acre) as a component tactic in an integrated pest management (IPM) approach to slow the spread of the gypsy moth. Also, field evaluations will continue in an effort to lower the dosage, volume and numbers of applications of the current formulation. Research will continue toward increasing activity of the product through the substitution of either more virulent natural strains of the virus or genetically engineered viruses. Also, a ready-to-use formulation that extends NPV activity on foliage will be sought.

For additional information concerning **GYPCHEK**, contact either Dr. John Podgwaite - Hamden, CT at (203)773-2033, Dr. Richard Reardon - Morgantown, WV at (304)285-1566, or local Cooperative Extension Service office.

Table 1. **Gypchek Tank Mix Ingredients**

Ingredient	Amt. per 3.9 liters (1 gal.)
Orzan LS[1] (ITT Rayonier, Inc., Seattle, WA)	227 g (6% w/v)
Pro Mo liquid supplement[2] (Southern States Cooperative, Inc., Richmond, VA)	470 ml (12.5% v/v)
Rhoplex B60A[3] (Rohm & Hass Co., Philadelphia, PA)	77.6 ml (2% v/v)
Stream Water (pH 5.0 - 8.0)	3.24 liters (85% v/v)
Gypchek[4]	7.2 g

[1] Lignosulfonate powder.
[2] mixture of condensed molasses and corn extracts.
[3] aqueous acrylic emulsion.
[4] lot 226, 3.47 X 10^{10} polyhedral inclusion bodies/g.

activity on foliage. Results of these tests were encouraging with greater than 95 percent net reduction in egg masses (Podgwaite et al 1987, Webb et al 1989). This tank mix was also evaluated on similar population densities occurring in the mountainous terrain of the George Washington National Forest in Virginia (Figure 4). Results were again positive with a greater than 95 percent net egg mass reduction in 5 of 6 treated plots. Defoliation in the control plots averaged 67 percent as compared to only 22 percent in the **GYPCHEK**-treated plots (Podgwaite and Reardon 1988). Several factors contributed to the effectiveness of the 1987 and 1988 **GYPCHEK** treatments: 1) the tank mix itself and its attributes as previously described; and 2) two applications three days apart allowed more active NPV to be continuously available to the target insect for a five to six day period.

The necessity for two applications (three days apart) at 2 gals/acre (= standard), coupled with a limited supply of product in the face of an increased demand, led to a series of field studies designed to maximize efficacy while minimizing application costs. From 1989 to 1991, as part of the Appalachian IPM Gypsy Moth Project (Reardon

PRECAUTIONARY STATEMENTS
HAZARD TO HUMANS

WARNING
Causes eye irritation. Do not get in eyes.

FIRST AID

In case of eye contact, immediately flush eyes with plenty of water for at least 15 minutes. For eyes, call a physician.

ENVIRONMENTAL HAZARDS

Avoid application to lakes, streams, or ponds. Do not contaminate water by cleaning of equipment or disposal of wastes.

DIRECTIONS FOR USE
GENERAL CLASSIFICATION

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

For foliar protection from gypsy moth larvae make 2 applications 7 to 10 days apart at the rate of 25.0 to 125.0 million gypsy moth potency units per acre in sufficient water for thorough and uniform coverage. Stickers and u.v. protectants may enhance performance of this product. Refer to technical bulletin for mixing and application instructions. **NEVER USE CHLORINATED WATER IN THE SPRAY FORMULATION.**

STORAGE AND DISPOSAL

Activity may be impaired by storage above 90° F.

Do not contaminate water, food or feed by storage or disposal. Open dumping is prohibited.
Do not reuse empty container.

Pesticide, spray mixture, or rinsate that cannot be used should be disposed of in a landfill approved for pesticides or buried in a safe place away from water.

Container disposal: Triple rinse and dispose of in an approved landfill or bury in a safe place.

Consult Federal, State or local disposal authorities for approved alternative procedures.

GYPCHEK
BIOLOGICAL INSECTICIDE
FOR THE
GYPSY MOTH

Active Ingredient:*	
Polyhedral inclusion bodies of gypsy moth nucleopolyhedrosis virus	14.6%
Inert ingredients	85.4%
TOTAL	100.0%

*This lot contains at least _____ million gypsy moth potency units per gram.

KEEP OUT OF REACH OF CHILDREN
WARNING

See back of tag for additional precautionary statements.

For use by or under the supervision of U.S. Forest Service.

NOTICE: The U.S. Forest Service makes no warranty, expressed or implied including the warranties or merchantability and/or fitness for any particular purpose, concerning this material except those which are contained on the U.S. Forest Service's label.

MFG. BY: U.S. Forest Service, UDSA
P.O. Box 2417
Washington, D.C. 20013

EPA ESTABLISHMENT NO. 27586-CT1

EPA REGISTRATION NO. 27586-2

NET WEIGHT: _____ **LOT NO.:** _____

MATERIAL SAFETY DATA SHEET[1]

(Form "Essentially Similar" to OMB No. 1218-0072)

PRODUCT NAME: GYPCHEK	CHEMICAL NAME: Nucleopolyhedrosis Virus of *Lymantria dispar*, The Gypsy Moth
FORMULA: As a biological organism, this a.i. does not lend itself to characterization by normal pesticide criteria.	MOLECULAR WEIGHT: N/A
SYNONYMS: N/A	CHEMICAL FAMILY: N/A

I. PHYSICAL DATA

BOILING POINT: N/A	FREEZING POINT: N/A
SPECIFIC GRAVITY ($H_2O=1$): N/A	VAPOR PRESSURE (mm Hg.): N/A
VAPOR DENSITY (AIR=1): N/A	EVAPORATION RATE (Butyl Acetate=1): N/A
% VOLATILES BY VOLUME: N/A	SOLUBILITY IN WATER (% by wt.): Insoluble

APPEARANCE AND ODOR:
Dried insect body parts and virus polyhedra.

II. HAZARDOUS INGREDIENTS

MATERIAL	PERCENT	TLV (Units)
N/A		

III. FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED): N/A	FLAMMABLE LIMITS. N/A

EXTINGUISHING MEDIA:
Water on burning container.

SPECIAL FIRE FIGHTING PROCEDURES:
None except to avoid inhalation of particulates released by fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
N/A

[1] Prepared in compliance with the U.S. Department of Labor, Occupational Safety and Health Administration (OSHA) Hazard Communication Standard (29 CFR 1910.1200).

IV. HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE:	Not established.
EFFECTS OF OVEREXPOSURE:	None known.
EMERGENCY AND FIRST AID PROCEDURES:	Remove from exposure situation.
NOTES TO PHYSICIAN:	Allergies and/or hypersensitivity may occur in some individuals.

V. REACTIVITY DATA

STABILITY: UNSTABLE ☐ STABLE ☒

CONDITIONS TO AVOID	Do not store in sunlight or at high temperatures.
INCOMPATIBILITY (materials to avoid	N/A
HAZARDOUS DECOMPOSITION PRODUCTS	N/A

HAZARDOUS POLYMERIZATION: MAY OCCUR ☐ WILL NOT OCCUR ☒

CONDITIONS TO AVOID	None

VI. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED	Containment and cleanup by placing in a sealable container for transport to an approved landfill or other disposal site.
WASTE DISPOSAL METHOD	Burn bags or triple rinse containers and dispose them and excess product at an approved site.

VII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (specify type)	Use normal work clothing and medical face mask as appropriate.
VENTILATION: LOCAL EXHAUST	N/A
MECHANICAL (general)	N/A
PROTECTIVE CLOTHING:	Goggles and face mask as appropriate.
OTHER PROTECTIVE EQUIPMENT:	None except to have eyewash, soap, and water available.

VIII. SPECIAL PRECAUTIONS

PRECAUTIONARY LABELING	**Keep out of reach of children.** **For use only in USDA-FS-supervised projects.** **Avoid direct application to water.** **Do not contaminate water by inappropriate disposal.**
OTHER HANDLING AND STORAGE CONDITIONS	**Avoid heat and sunlight.** **Dispose in approved sanitary landfill or by incineration, as allowed by State and local authorities.** **Do not reuse "empty" containers.**

DEPARTMENT OF TRANSPORATION	HAZARD CLASSIFICATION	**Non-hazardous, non-toxic**
	SHIPPING NAME	**Nucleopolyhedrosis Virus**
EPA REGISTRATION #	**27586-2**	
NAME	**Nucleopolyhedrosis Virus**	

The USDA Forest Service (FS) believes that the data contained herein are factual and the opinions expressed are those of qualified experts regarding the results of the tests conducted. The data are not to be taken as a warranty or representation for which the FS assumes legal responsibility. They are offered solely for your consideration, investigation, and verification. Any use of these data and information must be determined by the user to be in accordance with applicable Federal, State and local laws and regulations.

USDA Forest Service
P.O. Box 96090
Washington, DC 20090

Emergency Telephone No. (202) 837-8570

BOND®

SPREADER STICKER WITH SURFACTANT DEPOSITION AGENT

INGREDIENTS:

Synthetic latex	45%
Primary aliphatic oxyalkylated alcohol	10%
Inert ingredients	45%
TOTAL	100%

Ingredients exempt from residue tolerance under 40 CFR 180.1001

CALIF. REG. NO.
36208-50005

LOVELAND INDUSTRIES INC.
P.O. Box 1289 • Greeley, CO 80632
(303) 356-8920

WARNING: Keep Out of Reach of Children

NET CONTENTS: US GALLONS (Litres)

If in Eyes: Flush with water for 15 minutes, then get medical attention.
If on Skin: Remove contaminated clothing. Wash with soap and water. Get medical attention if irritation persists.
If Swallowed: First aid is not normally required, if symptoms persist get medical attention.
If Inhaled: Remove victim to fresh air. Apply artificial respiration if necessary.

BOND is a very efficient sticker for agriculture. BOND's adhesion properties increase initial deposition, reduces run-off and secures spray from rain or overhead irrigation. Apply sprays containing BOND at least one hour before an anticipated rain or overhead irrigation. Once the spray has dried, BOND will adhere the pesticides.

SHAKE WELL BEFORE USE. Fill spray tank ½ full with water and begin agitation. Add pesticides as directed by the label while maintaining agitation and continue to fill. After pesticides are thoroughly mixed, continue agitation and add BOND at desired rate. Some pesticides have stated adjuvant use rates. In all cases, the pesticides manufacturer's label should be consulted regarding specific adjuvant use recommendations and that rate followed. Do not add adjuvant at a level that would exceed 5% of the finished spray volume.

Suggested use rates: The sticking efficiency of BOND varies from pesticide to pesticide, so the usage rate will be associated with the formulation being sprayed.

1 to 2 pints per 100 gallons or 2 to 4 fluid ounces per acre

Rinse tank, lines and nozzles immediately after spraying. Observe the pre-harvest interval on the pesticide label when using BOND. No time limitations apply to non-food crops.

Store in cool, dry place. Store in original container. Keep container tightly closed. Do not reuse empty container.

Do no contaminate water, food, or feed by storage or disposal. Wastes may be disposed of on site or at an approved waste disposal facility. Triple rinse (or equivalent) adding rinse water to spray tank. Offer container for recycling or dispose of container in sanitary landfill, or by other procedures approved by appropriate authorities.

Loveland Industries, Inc. warrants that the product conforms to the chemical description on the label thereof and is reasonably fit for the purposes stated on such label only when used in accordance with the directions under normal use conditions. It is impossible to eliminate all risks inherently associated with the use of this product. Crop injury, equipment damage or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or the manner of application or use all of which are beyond the control of Loveland Industries, Inc. In no case shall Loveland Industries, Inc. be liable for consequential, special or indirect damages resulting from the use or handling of this product. All such risks shall be assumed by the buyer. Loveland Industries, Inc. makes no warranties of merchantability or fitness for a particular purpose nor any other express or implied warranty except as stated above.

LGJ052

MATERIAL SAFETY DATA SHEET

I. IDENTIFICATION OF PRODUCT

LOVELAND INDUSTRIES, INC.
P. O. BOX 1289
GREELEY, COLORADO 80632

EMERGENCY PHONE NUMBERS 1-800-424-9300 CHEMTREC
1-303-356-8920 LOVELAND IND.
CALL CHEMTREC 24 HOURS A DAY @ 1-800-424-9300

TRADE NAME: BOND
CHEMICAL NAME: Carboxylated Synthetic Latex (combination synthetic latex and primary aliphatic oxyalkylated alcohol)

II. HAZARDOUS COMPONENTS OF MIXTURES

COMPONENT	CAS #	%	TLV(UNITS)
NONE			

III. PHYSICAL DATA

BOILING POINT:	212F	VAPOR DENSITY(AIR=1):	Not Est.
BULK DENSITY:	8.41#/Gal	% VOLATILE BY VOL:	45%
SPECIFIC GRAVITY:	1.01g/ml	APPEARANCE:	White Emulsion
SOLUBLE IN WATER:	Yes	ODOR:	Slight Ammonia

VAPOR PRESSURE (mm OF Hg) @ 20 D C: Not Est.

IV. FIRE & EXPLOSION HAZARD DATA

FLASH POINT (TEST METHOD):	Not Est.
FLAMMABLE LIMITS (UEL AND LEL):	Not Est.
EXTINGUISHING MEDIA:	Water spray/fog, Foam, Dry Chemical, CO2.
SPECIAL FIRE FIGHTING PROCEDURES:	Wear protective clothing.
UNUSUAL FIRE AND EXPLOSION HAZARD:	None known

V. REACTIVITY DATA

STABILITY:	Stable
CONDITIONS TO AVOID:	None
INCOMPATIBILITY (MATERIALS TO AVOID):	Avoid multivalent transition metal ions as they will cause coagulation. Will also coagulate under low pH conditions.
HAZARDOUS DECOMPOSITION PRODUCTS:	None Known
HAZARDOUS POLYMERIZATION:	Will not occur

VI. HEALTH HAZARD DATA

EFFECTS OF OVEREXPOSURE: Animal studies indicate minimal toxicity through oral or dermal route. Eye and skin exposure indicated as minimally irritating.

EMERGENCY AND FIRST AID PROCEDURES:

EYES: Flush with water for 15 minutes, then get medical attention.

SKIN: Remove contaminated clothing. Wash with soap and water. Get medical attention if irritation persists.

INGESTION: First aid is not normally required, if symptoms persist get medical attention.

INHALATION: Remove victim to fresh air. Apply artificial respiration if necessary.

CARCINOGEN STATUS: Not listed by NTP, IARC or ACGIH.

VII. SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: Pick up with absorbant material and place in a container for proper disposal in accordance with all Federal, State and Local Regulations.

WASTE DISPOSAL METHOD: Do not contaminate water, food, or feed by storage or disposal. Dispose of in an approved waste disposal facility in accordance with all Federal, State, and Local Regulations.

CONTAINER DISPOSAL: Triple rinse (or equivalent) adding rinse water to spray tank. Offer container for recycling or dispose of in a sanitary landfill, or by other procedures approved by the appropriate authorities.

VIII. SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION: Wear a NIOSH/MSHA approved respirator if necessary.

VENTILATION:	LOCAL:	Recommended	SPECIAL:	None
	MECHANICAL:	Not required	OTHER:	None

PROTECTIVE GLOVES: Wear rubber or impervious gloves.

EYE PROTECTION: Wear goggles or a face shield.

OTHER PROTECTION: Full body covering clothing.

IX. SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN STORAGE AND HANDLING: Store in a cool dry place. Keep in original container, tightly closed. Do not reuse empty container.

OTHER PRECAUTIONS: Keep out of reach of children. Always launder contaminated clothing before reuse.

X. REGULATORY INFORMATION

Superfund Amendments and Reauthorization Act of 1986 (SARA) Title III. SARA 313 requires submission of annual reports of release of toxic chemicals that appear in 40 CFR 372.
Components which could require reporting are: None.

SARA TITLE III HAZARD CATEGORY

IMMEDIATE:	Yes	FIRE:	No	REACTIVITY:	No
DELAYED:	No	SUDDEN RELEASE OF PRESSURE:			No
FREIGHT CLASS:	ITEM 102120	CLASS 60			
DOT REGULATION:	Not Regulated				

Legal responsibility is assumed only for the fact that all studies reported here and all opinions are those of qualified experts. Buyer assumes all risks & liability. He accepts & uses this material on these conditions. He must have a copy of this MSDS where this material is handled.

Date of Issue: 10/25/90 Supercedes: 8/19/90

Georgia-Pacific

MATERIAL SAFETY DATA SHEET

LIGNOSITE® AN Sodium Lignosulfonate powder

SECTION I - PRODUCT IDENTIFICATION

Product Name and Synonyms: LIGNOSITE AN; Sodium Lignosulfonate.

CAS Name and No: Lignosulfonic Acid, Sodium Salt; CAS# 8061-51-6.

Chemical Family: Lignin.

Chemical Formula: Unknown.

Manufacturer's Name and Address:

GEORGIA-PACIFIC CORPORATION
300 Laurel Street (98225)
P. O. Box 1236
Bellingham, WA 98227

Telephone: 206-733-4410

Emergency Telephone Number: 1-800-424-9300 CHEMTREC

SECTION II - HAZARDOUS INGREDIENTS

COMPONENT	% (WT OR VOL)	ACGIH TWA UNITS	ACGIH STEL UNITS	OSHA PEL UNITS
None	---	---	---	---

SECTION III - PHYSICAL PROPERTIES

Appearance and Odor: Brown powder with no appreciable odor.

Molecular Weight: Unknown.

Boiling Point (Degrees Fahrenheit): Solid.

Melting Point (Degrees Fahrenheit): Decomposes.

Vapor Pressure (MM of Mercury): Nil.

Specific Gravity (Water = 1): Approx. 0.5.

Vapor Density (Air = 1): Not applicable.

Percent Volatile (By Weight): 2-10% moisture.

pH: Approx. 7-8.5.

Solubility in Water: Soluble.

Evaporation Rate (Butyl Acetate = 1): Not applicable.

SECTION IV - FIRE AND EXPLOSION DATA

Flash Point: Not applicable.

Fire Extinguishing Media: Water or CO_2.

Flammable Limits (Percent by Volume): LOWER UPPER

Not applicable

Special Fire Fighting Procedures & Equipment: Normal.

Unusual Fire and Explosion Hazards:

Some organic powders have been known to cause dust explosions. Avoid excessive accumulation of dust on floors, beams, or machinery. Ignition temperature is approximately 250 - 300°C.

SECTION V - REACTIVITY DATA

Stability: UNSTABLE ____ STABLE X

Conditions to Avoid: None known.

Incompatibility (Materials to Avoid):

Caution necessary with strong oxidizing agents.

Hazardous Decomposition Products: Sulfur dioxide (SO_2) possible.

Hazardous Polymerization: WILL OCCUR ____ WILL NOT OCCUR X

Conditions to Avoid: None known.

SECTION VI - HEALTH HAZARD INFORMATION

Effects from Routine Use: None known.

Effects of Overexposure:

Prolonged exposure to high levels of dust in air may cause sneezing, coughing or other nuisance symptoms.

Probable Routes of Exposure: Skin, inhalation, eyes.

Emergency and First Aid Procedures:

Eye Contact: Rinse immediately with water. Remove contact lenses; flush eyes with water. Consult a physician if necessary.

Skin Contact: Wash skin with soap and water. Seek medical attention if irritation persists. Launder contaminated clothing before re-use.

Inhalation: Move to fresh air to relieve nuisance symptoms.

Ingestion: Rinse mouth. Immediately dilute by drinking large quantities of water. After dilution, induce vomiting. Seek immediate medical attention. Never give anything by mouth to an unconscious person.

SECTION VII - TOXICITY DATA

Oral: This material is not toxic when administered orally to rats under the Federal Hazardous Substances Act (FHSA) criteria.

Dermal: This material is not an irritant when applied as a moist powder to the skin of rabbits under the FHSA criteria.

Inhalation: Unknown.

Carcinogenicity: Not listed as a carcinogen by IARC, NTP, OSHA or ACGIH.

Other Pertinent Data: This material is not an eye irritant when applied (in a 40% solution) to the eyes of rabbits under the FHSA criteria.

SECTION VIII - SPECIAL PROTECTION INFORMATION

Personal Protective Equipment

Protective Gloves: Rubber gloves recommended.

Eye Protection: Goggles recommended.

Respiratory Protection (Specify Type):

Air purifying respirator recommended for prolonged exposure to high concentrations.

Other Protective Equipment: As appropriate to prevent contact with body.

Ventilation:

Local Exhaust: Recommended.

Mechanical (General): Recommended.

Special: None.

Other: None.

SECTION IX - SPILL, LEAK, AND DISPOSAL PROCEDURES

Steps to be Taken in Case Material is Released or Spilled:

Wash area with water. Spills or releases of this material do not currently trigger the emergency release reporting requirements under the federal Superfund

Amendments and Reauthorization Act of 1986 (SARA). State and local laws may differ from federal law. Consult counsel for further guidance on your responsibilities under these laws.

Waste Disposal Methods:

Customary plant procedures for industrial waste treatment.

Clean Water Act Requirements: None known.

Resource Conservation and Recovery Act (RCRA) Requirements: None known.

SECTION X - REGULATORY INFORMATION

FDA: Not applicable.

USDA: Not applicable.

CPSC: Not applicable.

TSCA: CAS# 8061-51-6, Lignosulfonic Acid, Sodium Salt.

DOT: Non-regulated.

Proper Shipping Name: Lignin Pitch.

Hazard Class: None.

Label Required: None.

Identification No: None.

Other Pertinent Information: None.

EPA: Superfund Amendments and Reauthorization Act (SARA) Title III: Section 313, Supplier Notification.

Not applicable.

SECTION XI - SPECIAL PRECAUTIONS AND COMMENTS

Precautions to be Taken in Handling and Storing:

Store in a dry place and keep sealed until ready to use to prevent caking from moisture pickup. This material is biodegradable. Use caution when opening unvented containers of water solutions. Microbial activity may cause pressure accumulation.

Other Precautions: None known.

Registrations/Certifications: None.

Effective Date: 1/6/92. Supersedes: 2/17/89.

IMPORTANT:

The information and data herein are believed to be accurate and have been compiled from sources believed to be reliable. It is offered for your consideration, investigation and verification. Buyer assumes all risk of use, storage and handling of the product in compliance with applicable federal, state and local laws and regulations. GEORGIA-PACIFIC MAKES NO WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, CONCERNING THE ACCURACY OR COMPLETENESS OF THE INFORMATION AND DATA HEREIN. THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE SPECIFICALLY EXCLUDED. Georgia-Pacific will not be liable for claims relating to any party's use of or reliance on information and data contained herein regardless of whether it is claimed that the information and data are inaccurate, incomplete or otherwise misleading.

***

Georgia-Pacific

CHEMICAL DIVISION

GEORGIA-PACIFIC CORPORATION
300 West Laurel Street
Bellingham, Washington 98225
Post Office Box 1236 (98227)
Telephone (206) 733-4410
FAX (206) 676-7206

LIGNOSITE

PRODUCT INFORMATION SHEET

LIGNOSITE® AN

CAS Registry Number 8061-51-6
(Spent sulfite liquor, alkali-treated)

LIGNOSITE* AN Sodium Lignosulfonate is a modified product designed to provide optimum dispersive characteristics. LIGNOSITE® AN is available as a concentrated liquid or as a powder which readily dissolves in water to give a slightly alkaline pH. The low sugar content and the high total organic acid content are indicative of the high dispersive efficiency at neutral or alkaline pH values.

TYPICAL ANALYSIS

(Based on Oven-Dry Solids)

Sodium lignin sulfonate, %	80.0
Reducing sugars (as glucose), %	1.0
Carboxyl (as threonic acid), %	12.4
Sodium, %	8.0
Insolubles ($CaSO_4 \cdot 2H_2O$), %	0.5
pH of 10% solution	8.0

PHYSICAL PROPERTIES

Bulk density (powder), lb/ft^3	23
Powder size (through 100 mesh), %	100
Specific gravity (liquid), 25°/15°C	1.27
Gallon weight, lbs	10.6

More detailed analyses may be obtained upon request.

*LIGNOSITE is a registered trademark of Georgia-Pacific Corporation. All LIGNOSITE lignosulfonate products are derived from a uniform mix of softwood to insure maximum purity and optimum dispersive characteristics.

IMPORTANT: The technical data herein is believed to be accurate. It is offered for your consideration, investigation and verification. Buyer assumes all risk of use, storage and handling of the product. NO WARRANTY, EXPRESS OR IMPLIED, IS MADE INCLUDING, BUT NOT LIMITED TO, IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. Nothing contained herein shall be construed as a license to operate under, or recommendation to infringe, any patents.

SHIPPING

Georgia-Pacific manufactures LIGNOSITE® lignosulfonate products at its pulp and chemical complex in Bellingham, Washington, where deep-water port facilities are available for ocean-going vessels.

LIGNOSITE® AN powder is supplied in multi-wall bags, 50 pounds net weight. Palletizing, stretchwrapping and/or banding are available on request. This product can be shipped directly from Bellingham, Washington. LIGNOSITE® AN liquid is available as a 45% solution in tank cars or tank trucks from the Bellingham plant.

Shipments of lignosulfonates are not regulated by the Department of Transportation (DOT). The proper shipping name for this product is lignin liquor for the liquid form or lignin pitch for the dry form.

The designation for shipments of lignin liquor is NMFC Item 111270 for tank truck and UFC Item 56790 for STCC Item 2611215 for rail. Lignin pitch is shipped as NMFC Item 15270 by truck and UFC Item 6820 or STCC Item 2611210 by rail.

In case of emergency contact the Bellingham plant at (206) 733-4410.

STORAGE AND HANDLING

Bags of LIGNOSITE® AN lignosulfonate should be stored in a dry place and kept sealed until ready to use to prevent caking from moisture pickup.

Since LIGNOSITE® AN powder is a finely divided organic material, it can ignite and cause an explosion if allowed to accumulate on beams, machinery, and other surfaces. The minimum explosion concentration for lignin fines is 0.04 ounce per cubic foot. Good housekeeping should be practiced to avoid dust buildup.

LIGNOSITE® AN powder is readily soluble in water. Hot water and good agitation are recommended to facilitate dissolution. Solutions of LIGNOSITE® AN can be stored in mild-steel tanks. It is recommended that storage tanks have some means of agitation. Lignosulfonate solutions should be maintained at temperatures sufficient to provide suitable viscosities. Internal tank coils or tube bundles using either hot-water heat or low-pressure steam heat are recommended. Viscosity and corrosion data on this product are available on request.

Centrifugal pumps should be used to transfer LIGNOSITE® AN solutions that are maintained at temperatures to provide a flowable viscosity. Positive displacement pumps with low rpm are recommended to meter the product. All pumps should have mechanical seals or lubricated (non-grease) packing. Transfer lines should be heat traced and insulated.

Lignosulfonate solutions are biodegradable. Contamination by naturally occurring airborne organisms can occur and cause pressure to develop if the fermenting material is placed in a sealed container.

As with all organic material, caution is advised when storing or handling this product near strong oxidizing agents. Prolonged and excessive heating of LIGNOSITE® AN solutions can result in decomposition and the release of toxic sulfur dioxide fumes.

The use of appropriate protective clothing, e.g., goggles, rubber gloves, and/or suitable respirator, is recommended when handling LIGNOSITE® products. In case of skin contact, wash the affected area thoroughly with water. Accidental spills should be hosed down and diluted with water. Disposal should be in accordance with standard industrial waste disposal methods.

More information on the proper handling of LIGNOSITE® AN is in the material safety data sheet available from Georgia-Pacific.

SALES AND SERVICE

Georgia-Pacific produces a wide variety of lignosulfonate products. These products are manufactured under rigid controls to insure a finished product of the highest quality.

A nationwide team of sales representatives is available for assistance. They are supported by a staff of highly qualified research chemists and technical specialists who are skilled in the handling and application of lignosulfonates.

For more information, please contact one of the chemical sales offices listed below.

SALES OFFICES

NORTHWEST

P.O. Box 1236 (98227)
300 W. Laurel Street
Bellingham, WA 98225
Telephone 206-733-4410
1-800-365-4348
FAX 206-676-7217 -7206

1754 Thorne Road
Tacoma, WA 98421
Telephone 206-572-8181
1-800-955-5498
FAX 206-572-4721

CALIFORNIA

1426 Encino Avenue
Monrovia, CA 91016
Telephone 818-445-8007
FAX 818-445-1218

CENTRAL

Suite 125
14950 Heathrow Forest Pkwy
Houston, TX 77032
Telephone 713-442-1069
1-800-876-7863
FAX 713-442-1081

SOUTHEAST

P.O. Box 105605 (30303)
133 Peachtree St. N.E.
Atlanta, GA 30348
Telephone 404-220-6185
FAX 404-230-1676

(10/92)

APPENDIX D

PROJECT ACCIDENT PROCEDURES FOR GENERAL PERSONNEL AND AIRCRAFT

ACCIDENT PROCEDURES

Should a personal injury or motor vehicle accident occur, response to it should be as outlined herein. For further safety information, consult the Health and Safety Code Handbook.

1. Administer first aid to the victim, and get medical treatment if necessary.

2. Note any sequence of events leading to the accident.

3. Contact your work supervisor as soon as possible. Supervisor should have information of each crew menbers emergency data including home phone #, and who to contact in event of emergency, as well as allergy information, blood type, etc.

4. Fill out a CA-1 and any other necessary reporting forms within 24 hours of the accident.

5. Take corrective action to avoid silmilar actions in the future.

When emergency medical information or assistance is needed, and telephone is not readily avaiable, use a Forest Service radio to make contact with Project Coordinator or Project Supervisor, or USFS District or Supervisor's Office who can then follow through with providing advance notification to a physician's office or medical facility.

These are the first numbers to contact:

COUNTY EMERGENCY MEDICAL SERVICE DISPATCHERS/AMBULANCE SERVICES		
Randolph County	636-1211	
Pocahontas County	799-4567	151.340
Pendleton County	567-2412 (Circleville)	
	358-7911 (Franklin)	
Grant County	257-1212	

HOSPITALS		
Davis Memorial, Elkins	636-3300	637-3265 (Emergency Room)
Pocahontas Memorial, Marlinton	799-7400	
Tucker County Hospitals, Inc. Parsons	478-2511	
Ruby Memorial, Morgantown	598-4000	
Grant Memorial, Petersburg	257-1026	

POISON CONTROL CENTER	
WV Poison Control Center Charleston	1-800-642-3625

WEST VIRGINIA STATE POLICE

Elkins	637-0200
Marlinton	799-4101
Parsons	478-3101
Franklin	358-2200
Petersburg	257-1411
	257-1818 (Sheriff)

FIRE DEPARTMENTS

Circleville	567-2323
Elkins	636-3412
Franklin	348-7911
Harman	227-4500
Marlinton	799-4211
Parsons	478-4949
Petersburg	257-1221

On a periodic basis, inquiries should be made to the hospitals and poison control center listed above, to be sure that any anticipated medical needs associated with the project can, in fact, be handled by the facility.

Notification and Reporting Procedures

1. Notification Procedures: As used in this Health and Safety Plan, ACCIDENT shall mean: (1) destruction or substantial damage to a vehicle, (2) minor, serious, or fatal injury to persons working on the project, whether Forest Service employees, contractor employees, or other persons.

As used in this Health and Safety Plan, INCIDENT shall mean any mishap, malfunction, or situation involving vehicles or persons on the project which results in a deviation from standard procedures, or has the potential of resulting in an accident.

Notification procedures should follow standard operating channels. The employee initiates notification procedures by notifying:

Gary Bustamente, MNF
304-636-1800

who notifies

Peter Rush, FHP, Morgantown
304-285-1542

who notifies

Gerard Hertel, FHP, Radnor
215-975-4124

MONONGAHELA NATIONAL FOREST TELEPHONE NUMBERS

Supervisor's Office
Jim Page, Forest Supervisor
Elkins, WV
Phone: (304) 636-1800

Potomac Ranger District
Nancy Feakes, District Ranger
Petersburg, WV
(304) 257-4488

AIRPORT OPERATIONS

Petersburg Airport
(304) 257-2682

USFS Incident Command Unit
(304) 257-____

WV-Agr Gypsy Moth Spray Project Contact
(304) 257-____

To be included in notification are the following facts:

- Location of accident or incident.
- Ownership of property involved.
- Weather conditions at time of accident or incident.
- Vegetation and animal species involved.
- If people were involved, obtain written statement from the attending physician.
- Description of accident or incident including events immediately preceeding and relating to the accident or incident. (Include soil type and moisture conditions if they have a bearing on absorption or movement of the moisture in the soil.
- Local, State and other Federal agencies notified of accident or incident.
- Action taken to coordinate corrective measures with other agencies.
- Record of sample:
  - What was collected (carcass, plant material, water, soil, etc.)
  - Time and date of samples.

If a Forest Service employee, volunteer, human resource program enrollee, job corp enrollee, visitor, contract employee, or permanent is involved in an accident that involves the Forest Service and results in the death, injury, illness, and/or property damage, consult FSM 6730 "Accident Reporting and Investigation", for appropriate reporting and investigation procedure.

AIRCRAFT SAFETY AND INCIDENT REPORTING

Safety

1. No spectators will be allowed in the loading and fueling area. Spectators will be prohibited within 100 feet of the Operations Area (loading and fueling areas). Spectators should be behind fences or inside airport terminal.

2. Smoking will not be permitted within 100 feet of any fueling or loading operations.

3. All loose gear in the area of the helispot susceptible to rotor downwash shall be secured or removed.

4. Approach or leave aircraft only when authorized by pilot or base manager.

5. Only those personnel authorized by the Project Supervisor or Project Coordinator will be in the Operations area. Ear and eye protection will be used.

6. Operations Area will be cordoned off and signed "authorized personnel only" and "no smoking".

7. Prior to any refueling operations, all aircraft engines will be shut down, rotors stopped and all passengers off-loaded except as authorized in the contract for the spray aircraft.

8. All landing approaches and departure routes will be kept clear of vehicles and personnel.

9. Wind indicator (wind sock) is required.

10. When approaching or leaving the aircraft, remain in full view of the pilot and keep in a crouching position.

11. Static grounds will be provided for both the loading and refueling operations and should be used when necessary.

12. All personnel having direct involvement in helicopter operations will be familiar with and comply with the directions in FSH 5709.12, Helicopter Operations Handbood and the Forest Service Manual Section 5700.

13. All specification in the application contract will be adhered to regarding aircraft operation, safety and communications.

Incident/Accident Reporting

Philosophy:

Although no one conducts aviation operations with the intent of having an accident, the possibility is always there. When an accident does happen, one very common factor occurs and that is confusion. The attached Aircraft Pre-accident Plan is a document by which a given FS unit that has control of one or more aircraft can preplan most of the things that must take place in the event of an

accident. This should eliminate most of the confusion that usually occurs and assist in expediting search and rescue efforts.

Another key element in safe aviation operations is the assurance that all flight crews are familiar with the known flight hazards of the area in which they will be operating.

The last page of the attached document provides guidelines for establishing a hazard map for your local area.

General:

This plan establishes the actions to take in the event of an overdue aircraft, an aircraft accident or incident.

The scope of this plan outlines the basic procedures necessary to activate all emergency search, crash and rescue services as well as associated support activities as rapidly and orderly as possible.

The plan is broken down into three categories: OVERDUE AIRCRAFT, CRASHED AIRCRAFT ON, AND OFF AN AIRPORT/HELIPORT. Each category lists actions to take and references either Appendix A, B, or C for phone numbers and sequence. Do not delay notification because one or two items in the Appendix are unknown at the time - GET THE BALL ROLLING; keep an accurate written log and fill in the blanks as best you can.

SOMEONE'S LIFE MAY DEPEND ON IT!

CRASHED AIRCRAFT - ON AIRPORT/HELIPORT

1. Call local crash/rescue, if available.
   Randolph Emergency Managment (304) 636-1945 or 636-2000 (24 hr. service)

2. Rescue survivors - render first aid.

3. Complete actions in Appendix C.

4. Get information in Appendix B.

5. Call: ****
   (If on a Forest, notify Forest Supervisor first, then continue notification sequence below.)

   A. Regional Aviation Safety Officer. Office (414) 297-3632 Ed Stone
      Home _____

   B. Regional Aviation Officer. Office (414) 297-3632 Bill Dickson
      Home (414) 421-4064

   C. Regional Director, Aviation & Fire. Office (414) 291-1893 Richard Bacon
      Home (414) 375-1512

   D. EIFCC Coordination Center. Office (414) 291-3690 Ginger Brudevold
      Home (414) 763-9004

6. Evacuate injured.

   A. Notify hospital, doctor. Phone Number (304)636-2000
      Randolph Emergency Management

   B. Notify local law enforcement. Phone Number (304) 636-3101 State Police
      (304) 636-2100 Sheriff

   C. Complete Appendix B and call National Aviation Safety Officer,
      Phone Number _____, Home Phone _____,
      Pager Number _____. Be prepared to give as much information as you have in Appendix B.

****Call list from top to bottom in sequential order. If a person does not answer go directly to the next name on the list.

OVERDUE AIRCRAFT

1. Obtain available information outlined in Appendix A.

2. Call Dispatcher. Phone Number (304) 636-1800 S.O. (8AM to 5PM)

   Dispatcher will:

   A. Call local FAA Flight Service Station. Phone Number (304) 636-0810 .

   B. Notify Aviation Officer. Phone Number (304) 636-1800 (W) Mike Herth

   C. Notify EIFCC Coordinator. Phone Number (304) 297-3690 . Wayne Ballou

   D. Notify Forest Supervisor if applicable.

      Commercial (304) 636-1800
      Home (304) 636-8093 Jim Page

      Aviation Safety Officer: Ed Stone (414) 297-3632

   E. Notify Regional Aviation Safety Officer:
      Commercial (414) -3744 Home (414) 543-5903

      Aviation Safety Officer will call:

      (1) Local Law Enforcement. Phone Number (304) 636-3101 . State Police
      (2) Complete Form FS 5700-14 (Accident/Incident Report).

CRASHED AIRCRAFT - OFF AIRPORT/HELIPORT

1. Rescue survivors - render first aid.

2. Coordinate local crash/rescue, if available.

3. Witnesses of aircraft accident will complete actions in Appendix C.

4. Complete actions in Appendix C.

5. Get information in Appendix B.

6. Call _____.
____(If on a Forest, notify Forest Supervisor, then continue notification in sequence below.) Phone Number _____

* A. Regional Aviation Safety Officer. Office (414) 297-3632 Ed Stone
Home _____

* B. Regional Aviation Officer. Office (414) 297-3632 Bill Dickson
Home (414) 421-4064

* C. Regional Director, Aviation & Fire. Office (414) 297-1893 Richard Bacon
Home (414) 375-1512

* D. EIFCC Coordination Center. Office (414) 297-3690 Answering Service
After hours and on weekends. (414) 778-7355

* E. Notify Regional Safety & Health Manager. Phone Number (414) 297-3811
Lloyd Hendrickson

F. Complete Appendix B and call National Aviation Safety Officer
Phone Number (703) 235-3300 Home Phone Number (703) 241-5431
Pager Number (202) 837-8572

* Call list from top to bottom in sequential order. If a person does not answer, go directly to the next name on the list.

LIST OF TELEPHONE NUMBERS

NOTE: (304) 636-2000 (24 hr. service) Communication Service operated by Sheriff's Department (304) 636-2100 will automatically notify REMA.

1. Crash/Rescue Personnel: Randolph Emergency Management Agency
   2 Randolph Avenue (Court House)

2. Ambulance: Elkins, WV (304) 636-1211 or (304) 636-1945

3. Hospital: Davis Memorial Hospital (304) 636-3300
   Ashby Craft (Operates the REM) (304) 636-8290 (Home)

4. Sheriff/Police: WV State Police (304) 636-3101
   Harrison Avenue

5. Office*: Region 9

   A. Safety:
   B. Aviation: (414) 297-3632
   C. Information:
   D. Dispatcher: EIFCC (414) 297-3690
   E. Other:
   F. Other:

6. If all contact attempts to Region 9 Aviation and Fire personnel fail, then call direct to Washington Office.

7. Washington Office**:

   A. Safety Officer : Dale Matlack: (703) 235-3300 Home: (703) 241-5431
      Pager: (202) 837-8572
   B. Assistant Director for Aviation: Fred Fuchs (Fox) (703) 235-3398
      Home: (703) 689-
   C. Director for Fire & Aviation: L.A. (Mic) Amicarella (703) 235-8034
      Home: (703) 323-68
   D. Information Office:
   E. Dispatcher:

8. Tower:

9. FAA Flight Service Station:

10. County Coroner:

* Local agency office, i.e. Forest, Park Headquarter, FWS Area Office, etc.

** Next higher level office in your organization such as Regional Office, State Office, etc.

APPENDIX A

Date _____ Local Time _____

1. Name of Pilot
2. Names of passengers/crew members (how many?)
3. Aircraft tail number.
4. Type of aircraft.
5. Color of aircraft.
6. Type mission.
7. Last known point of takeoff.
8. Last known location.
9. Point of intended landing.
10. Was flight plan filed with FAA/Forest/Region Dispatch (which?)
11. Was flight following being accomplished?
12. Time aircraft was due at destination.
13. Name, telephone number and location of person coordinating location effort.

NOTE: Aircraft is considred overdue 30 minutes after filed arrival time or position report.

REMARKS:

APPENDIX C

1. Rescue:

   A. Assist survivors and render first aid until relieved by medical personnel.

   B. If there is any danger of post crash fire--move survivors a safe distance away.

   C. Keep bystanders and unauthorized personnel out of crash area.

   D. Establish "No Smoking" rule. Fire and explosion are a "real" danger with residual fuel and hot metals.

2. Search the wreckage carefully for other survivors.

3. Notify the Regional Aviation Safety Officer Direct.

4. Preserve the accident site. Every piece of the aircraft and its location is important to the investigators. Nothing should be disturbed. Use local law enforcement to secure site.

5. **Identify witnesses:

   A. Obtain written statements, if possible.

   B. Names, addresses, phone numbers.

**This is a very critical element.

APPENDIX E

1993 MONONGAHELA NATIONAL FOREST
AIRCRAFT SPRAY RECORD FORMS

SPRAY RECORD
1993 GYPSY MOTH SPRAY PROJECT
MONONGAHELA NATIONAL FOREST

AIRCRAFT TYPE: _____ TAIL NO.: _____

					FLIGHT TIME			SPRAY TIME			
Block #	R.D.	Acres	Treat-ment	Spray Date	Start	Stop	Total	Start	Stop	Total	Gal. Spray
301	P	459	Single								
302	P	1057	Single								
303	P	1773	Single								
304	P	337	Single								
305	P	641	Single								
306	P	269	Single								
307	P	341	Single								
308	P	304	Single								
309	P	187	Single								
310	P	981	Single								
311	P	985	Single								
312	P	1363	Single								

Block #	R.D.	Acres	Treat-ment	Spray Date	Start	Stop	Total	Start	Stop	Total	Gal. Spray
313	P	800	Single								
314	P	337	Single								
315	P	484	Single								
317	P	307	Single								

Pilot's Signature

Inspector's Signature

DAILY SORTIE REPORT

Project coordinator:
Date: Location:
Aircraft ID: Pilot:

Load #	Gallons	Take off time	Return time	Acres treated	Block ID

COMMENTS (Cause of delays, accidents, reason for shut-downs etc.)

SIGNATURES
Project Coordinator:

Contractors Representative:

Prepared by USDA, Forest Service, FPM, Morgantown, WV 5/90

APPENDIX F

NON-TARGET MOTH SURVEY FOR RARE BOREAL SPECIES

Non-target Moth Survey of North Fork and Cave Mountains,
Seneca Rocks National Recreation Area, Potomac RD, West Virginia

Introduction

Unique vegetative types are known to exist in the Seneca Rocks National Recreation Area on North Fork and Cave Mountains because of the geology, soils, terrain, climate and limited past human disturbance. Dwarf pine forests along the sandy summit of North Fork Mountain, riparian forests in the Smoke Hole, cedar glades on Cave Mountain, and limited areas of shale barrens are several of the vegetative types in this part of the Ridge and Valley Province of eastern West Virginia. Numerous plants are endemic to this area and many others exist as disjuncts from more northern and western biogeographical provinces. It is reasonable to assume that many species of moths are associated with the plants that seem to require one or more of these forest habitat types for survival in West Virginia.

Twenty-two moth species are listed on the WVDNR Natural Heritage Program's Species of Special Concern in West Virginia (refer to Table 1). One of these species, the Boreal sprawler moth, Brachionycha borealis (Smith), can be used as a typical example of just how little is known about the non-target moth fauna in the area. Despite our incomplete knowledge, this and other moths have influenced current management decisions about gypsy moth spraying. Whether or not these decisions have been correct depends on how well the life history and how preference of this and other moths are understood.

Several known populations of Brachionycha borealis have been documented in West Virginia in Grant and Pendleton Counties. The total range of the species remains unknown because the occurrence of this species is sporadic in West Virginia and specific studies as to life history and host food plant of this species in West Virginia are completely lacking. Because the total known range is within the spray area for gypsy moth suppression, there is potential for eliminating this species from the state without ever knowing this information. The West Virginia Department of Natural Resources Nongame Wildlife and Natural Heritage Programs worked initially with the West Virginia Department of Agriculture to prevent spraying of known rare lepidopteran locations. In 1993, the Monongahela National Forest's gypsy moth proposed spray blocks were substantially modified in the vicinity of sites known to have Brachionycha borealis to avoid direct treatment of these sites. Additionally, the gypsy moth specific microbial insecticide GYPCHEK was recommended for use to avoid treating this and other non-target moths of Special Concern within the proposed spray blocks on North Fork and Cave Mountain. Foraging colonies of the Federally Threatened and Endangered Virginia Big-eared bat, which feeds on moths, were also considered in this decision. Unfortunately knowledge of the moth fauna of the area is poor and inadvertent spraying may jeopardize the long-term survival of non-target moths. Out of ignorance, areas will undoubtedly be sprayed that harbor the species with potentially catastrophic loss of local populations.

Proposal

Throughout the entire the North Fork Mountain area there is little to no information about the Moth Species of Special Concern, such as Brachionycha borealis, or their food plants or life histories. Therefore, we propose to conduct field surveys to locate and document populations to better determine the species present, their abundance and status in this part of West Virginia, and to determine their food plants and life histories.

The WVDNR Natural Heritage Program currently has several locations where moth species of special concern occur in Grant and Pendleton Counties. These locations will be used to document the vegetative types inhabited by the various species, such as Brachionycha borealis, in search of new sites to determine their abundance and distributions in this part of West Virginia. A composite map will be created showing

population distribution and abundance of all moths of Special Concern, like Brachionycha borealis, on the Monongahela National Forest in West Virginia.

Adult moths normally begin flying during the middle of March. Unseasonable cold or warm temperatures may require an adjustment in the field schedule.

Responsibilites

Several counties, Grant, Pendleton, Randolph, and Tucker, will be surveyed. Portions of these counties will be grouped for field survey efficiency into three sections based on county boundaries and National Forest and Non-National Forest ownerships. Because of the planned use of GYPCHEK on North Fork and Cave Mountains by the USDA, Forest Service in May 1993, no influence of previous spraying on non-target moth populations is anticipated. Any conflicts between the occurrence of this non-target moth survey and previous spray blocks under the USDA, Forest Service AIPM and/or West Virginia Department of Agriculture will be resolved so as not to survey area previously treated with BT and/or Dimilin.

WVDNR Field Technicians hired by the WVDNR Game, Non-game and Natural Heritage Programs will conduct the surveys. Data about each trap site/night will be recorded on the attached form, and locations mapped on 7.5-minute quad maps. WVDNR will arrange for the transport the samples biweekly to the Carnegie Museum of Natural History (CMNH), Pittsburgh, PA. CMNH, Invertebrate Zoology Section, will procure the collecting and sample processing equipment and supplies, and provide training on these subjects. CMNH Staff Entomologists and Preparators will process the samples collected. Most of the processing would involve pinning, labelling, sorting, identification, storage and creating and managing the data base for all samples. Additionally, CMNH Entomologists would be involved with live collections of moths at sheet with ultra-violet and mercury vapor lights, and hand collecting from plants, to obtain females for transport to CMNH for rearing. This work will be done in cooperation with a USFS Entomologist who would recommend the sites to be trapped. There would be no direct charges to the survey for the time and expenses of the Professional Entomologists from CMNH or the USFS.

The surveys will run for twelve weeks beginning March 15 through June 1, 1994. Two field technicans will set up 4 light traps and 4 bait traps each of two nights/week. The first and fourth days will be spent setting up and picking up the traps and the fifth day for recording data on the attached form, mapping of areas checked, or transporting the samples. Based on information provided by CMNH, all populations of moths of Special Concern, such as Brachionycha borealis, will be mapped and their abundance documented. Host plant and life history information will be documented and provided to the WVDNR Natural Heritage Program data base for the moths of Special Concern.

Funding

The proposed work is estimated to cost $30,750 which would be divided between WVDNR ($12,250) and CMNH ($18,750) as shown below. Separate Challenge Cost Share Agreements would be prepared by the Monongahela NF for the various aspects of the work assigned to WVDNR and CMNH. Funding would come from the Gypsy Moth Suppression Funding allotted to the Monongahela NF during FY1993. Therefore, the necessary agreements must be in place to obligate the funding by the end of FY1993.

WVDNR Field Activities

60 days each field tech X 2 techs = 120 days

Payment of $65.00/day will be made which will include all expenses incurred by field personnel.

120 days x $65.00/day =	$7,800.00
Inhouse (DNR) compilation of sites, supervision of field personnel, final report writeup =	2,250.00
Topographic maps of potential sites =	500.00
Transportation of Frozen Samples	2,000.00
TOTAL	$12,250.00

CMNH Processing Work

120 days for 1 preparator, labels, and data entry = 120 days

Payment of $65.00/day will be made which will include benefits.

120 days x $65.00/day =		$7,800.00
Collecting equipment and supplies for 8 light traps (4 spares) for 8 bait traps (4 spares)	=	$3,500.00
Storage freezer and supplies		$1,000.00
Preparation equipment and supplies	=	$5,000.00
Final report writeup =		$1,200.00
TOTAL		$18,500.00

TOTAL PROJECT COST FOR NON-TARGET MOTH SURVEY = $30,750.00

Presentation of Results

A final report from CMNH will be available for the Monongahela NF by September 1, 1994.

WEST VIRGINIA NATURAL HERITAGE PROGRAM
MOTH SPECIES OF SPECIAL CONCERN

	Order/Genus and Species	Common Name
	Lepidoptera	
	Agrotis manifesta	A noctuid moth
	Agrotis stigmosa	A noctuid moth
	Anaplectoides brunneomedia	A noctuid moth
	Aplectoides condita	A noctuid moth
**	Brachionycha borealis	Boreal sprawler moth
	Catocala dulciola	Sweet underwing moth
**	Catocala herodias gerhardi	Pine barrens underwing moth
	Catocala miranda	A noctuid moth
	Chaetaglaea cerata	A noctuid moth
	Grammia phyllira	A tiger moth
	Hadena ectypa	A noctuid moth
	Lithophane oriunda	A noctuid moth
**	Lithophane sp 1 nr. querquera	A pinion moth
**	Merolonche dolli	Doll's merolonche moth
**	Metarranthis apiciaria	Barren's metarranthis moth
	Zale calycanthata	A noctuid moth
	Zale squamularis	A noctuid moth
	Zale submediana	A noctuid moth
**	Catocala marmorata	A noctuid moth
**	Citheronia regalis	Royal walnut moth
**	Hyppa contrasta	A noctuid moth
**	Pyreferra ceromatica	A noctuid moth

** West Virginia Natural Heritage State Element Ranking Form (SERF)
Prepared as of 12 Jan 93

NON-TARGET MOTH SURVEY - 1994

SITE NAME: _____ QUAD MAP: _____

LOCATION: _____

_____

DATE: _____ HOUR: _____ SURVEYOR: _____

GENERAL DESCRIPTION OF SITE: _____

_____

_____

TYPE OF FOREST (Tree species and size classes): _____

_____

Other: _____

WEATHER:	Clear	Cool	Still
	Partly Cloudy	Warm	Light Breeze
	Overcast	Hot	Windy

NUMBER OF MOTHS TAKEN: Number: _____

REMARKS: _____

_____

_____

_____

_____